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Bundesministerium
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МИНИСТЕРСТВО ПРИРОДНЫХ
РЕСУРСОВ И ЭКОЛОГИИ
РОССИЙСКОЙ ФЕДЕРАЦИИ

giz Deutsche Gesellschaft
für Internationale
Zusammenarbeit (GIZ) GmbH

INTRODUCTION TO BEST AVAILABLE TECHNOLOGY.

AN ANALYSIS OF TECHNOLOGY-PUSH INSTRUMENTS IN THE EUROPEAN UNION

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1. Executive summary

Introduction

Significant environmental degradation connected with economic development has occurred in the past and is expected to continue if no action is taken. This has led to increased attention, both to efficient use of energy and resources as well as to the adoption of cleaner technologies by industry. As part of this process a lot of countries have taken measures to promote Best Available Techniques (BAT). BAT is a regulatory instrument, which mandates enterprises to adopt certain technologies or techniques leading towards a transition to cleaner or environmentally friendly technologies across all economic sectors.

The EU developed in 2010 a general framework based on integrated permits to prevent and control industrial emissions. The concept of BAT is a key element of that framework. Although it is too early to see the final practical results in Europe, trends in industrial emissions are promising.

In the Russian Federation, a BAT-based policy to prevent and control industrial emissions was introduced in 2014 and is being applied from 1 January 2019. Based on the EU experience and the specific features of the domestic economy in Russia, Federal Law No. 219-FZ provides for a gradual transition to a technological regulation system based on the BATs.

This study assesses the experience with economic instruments to promote transition to the BAT in a number of European countries and draws lessons learnt for the Russian Federation. It draws on the input from the expert workshops and interviews in Russia on the key challenges and opportunities for application of economic instruments to support BAT in Russia. The study analyses primary data and reviews previous studies on the performance of various schemes and offers recommendations for the design of such instruments in Russia.

Economic instruments offer a cost-effective opportunity to support adoption of the Best Available Techniques

Encouraging BAT in the industrial sector requires policy measures and incentives that are flexible and easily accessible by companies. Different types of measures exist, including economic instruments (‘sticks’ and ‘carrots’), as well as behavioural measures, education and information, regulatory instruments, research and development, and voluntary approaches. ´Stick´ measures impose a penalty for not complying with the BAT in a timely manner, while ´carrots´ refers to measures that provide a fiscal incentive for compliance with BAT. The latter is often in the form of a direct subsidy to make the investment or a subsidised credit on a loan when making the investment. Other ‘carrot-type’ economic instruments include public loan or/loan guarantees; publicly owned equity; pricing policies; tax credits; and other grants.

There is limited information available on the overall effectiveness of the different instruments used. Particularly successful have been deposit refund schemes, taxes on plastic bags and taxes on solid waste to landfills, for example in the UK. On the other hand, pollution charges on emissions to air and water have had a less meaningful impact.

Estimates of the multiplier effect suggest that some economic instruments offer a very cost-effective way to support BAT transition. For example, in the Netherlands for every euro spent on subsidised loan for BAT the amount by which expenditure increased was 12 times. In the Basque Country, estimates of the multiplier effect in a similar programme was 1:4.

Effectiveness can vary across these instruments for many reasons. The degree to which subsidies are targeted to enterprises that would otherwise not make the investment is a key factor. Related to that are the terms of the subsidy. Then there is also the quality of the risk assessment in making subsidized loans.

The main criteria for selecting the economic instruments to promote BAT is to achieve compliance in a timely manner (i.e. as quickly as possible) and at least cost to the government and to the enterprises respectively. In the case of the stick, a benchmark that could be used to limit the impact on competitiveness is not to push the cost of environmental regulation much above one percent of the value of manufacturing value added.

In the case of the carrot, the key idea is to lower the cost of advanced implementation enough so that the enterprise finds it profitable to go for a BAT compliant option. At the same time, it is important to keep the costs to the government at a minimum, lowering the costs just enough to make the early implementation of BAT the option of choice for the industry. The key parameters that determine the subsidies are the market rate of interest that enterprises face and the term of the loan.

In practice, other factors will also play a part in the decisions. One particularly important factor is the difference in cost of operating the plant with and without BAT. Another factor will be experience with similar loans. A third factor is the presence of pollution charges. If such charges exist, this will mean that the cost of going for earlier implementation will fall and the critical loan rate can be a little higher. Other important factors that will influence the choice of instruments and the values chosen include fairness, leverage effects, free-riding and spill-over effects scope of fraud, and experience with similar instruments in other countries.

The Russian Federation establishes regulatory framework for the BAT transition and several economic instruments, but faces implementation challenges

The legislative basis for the introduction of the BATs in Russia was set through the Federal Law No. 219-FZ that was adopted in July 2014 and entered into force in January 2015. It introduces a regulatory system for gradual transition to the BATs and Integrated Environmental Permits (IEP) in Russia, which replace the previous system of several types of environmental permits. One of the key features of the law is the classification of enterprises into four categories depending on the level of their adverse environmental impact and application of the differentiated regulatory requirements to each category in respect to transition to the BAT. Operators of industrial facilities of the 1st category, which are facilities with significant negative environmental impact,

from January 1, 2019 must apply for integrated environmental permits based on the principles of the BAT.

There is no agreement among the expert community and key stakeholders in Russia on the expected cost of transition to the BAT. Assessments vary between 4 and 8 trillion RUB, equivalent to about 5.39 – 10.78€ billion. Government estimates that transition to the BAT based on the published Best Available Techniques Reference Documents (BREFs) in Russia for category 1 enterprises would require investments of 8.2 trillion RUB (in 2016 prices), equivalent to about 11.05€ billion, which they consider comparable with historic levels of investment. Overall, the government expects that implementation of the BAT will lower the negative environmental impacts and will become one of the key instruments of import substitution and competitiveness improvement of the Russia industry. However

The law introduces specific economic instruments to facilitate the transition and to support the enterprises in adopting BATs. However, this study identified several barriers in Russia that need to be addressed. Regarding charges and fines, there is a strong perception among the key stakeholders of the lack of fairness in the fundamental principles on which the system of charges is built and that the system of environmental charges and fines is not meant for incentivising action, but rather for filling the budget. There are also concerns around the levels of the fines, the capacity of the regulator to enforce the standards and collect the fines.

Local experts that provided input to the study through the workshops and interviews were generally sceptical about the prospects of instruments of direct support to BAT currently foreseen in the Russia's legislation (e.g. in the form of soft loans, subsidies and tax incentives) in the short-term due to several barriers. The main overall concern was high bureaucracy and heavy reporting burden and litigation risks, which raise costs for the private sector. Specific barriers that need to be overcome in relation to soft loans are high interest rates, short lending periods and high collateral deposit. Furthermore, the current system of financial incentives is mainly geared to support technology producers rather than polluting enterprises. Institutionally there are also challenges around additional expertise required for administration of financial incentives.

Overall, many of the issues raised reflected that Russia is still largely at the design and very early stages of the implementation process for the BAT transition. While the key economic instruments have been outlined in the legislation and regulatory documents, their operational details still need to be largely worked out and refined along the way. There is also a need to strengthen capacity of the key actors and to address the lack of successful experience at scale in Russia with economic instruments of stimulating investment. European experience offers useful insights into potential ways to address some of these barriers.

Economic push-instruments for BAT in EU member states

EU Member States apply economic instruments to create the market conditions necessary to encourage investment by the private sector in energy and resource efficient technologies, and to push the development and/or market uptake of clean technologies. Tax relief programs, low interest loans and grants seem to be the preferred instruments. These instruments lower the capital cost of investments, giving an incentive to firms to invest in resource and energy efficient technologies. Case studies in Germany, the Netherlands, the Basque Country in Spain, Poland, Turkey and the United Kingdom suggest that these kinds of program appear to be quite effective in encouraging sustainable investments.

Technology adoption

Data indicates that entrepreneurs rely on the schemes. An average of 5,000 applications are submitted each year to the German BMWi support program for the use of highly efficient cross-cutting technologies. Likewise, the requested investment amount and the claimed budget in the Netherlands and the United Kingdom has increased over the years. In Turkey, in its 8 years of operation, TurSEFF has utilized € 600 million of funds to finance 1,363 projects, while in Poland PolSEFF 1 financed 2,012 energy efficiency projects. Yet in Spain, the number of applications and the amount financed by the BCTL have decreased over time. The Basque Government (2018) argue that the reduction in the number of applications was due to a big extent to be financial crisis.

Emissions savings

All support schemes analysed in the study resulted in tangible improvements in environmental performance, for example as measured by the reduction in CO2 emissions and energy consumption. The total amount of CO_2 saved by purchases of technologies covered by the UK ECA energy saving scheme was estimated at around 6.25 Mt CO_2 in 2010. The 2017 report of the Netherlands EIA program estimates that the investments in energy efficient technologies are expected to deliver cumulative CO_2 savings of 0.98 Mt CO2 in 2017. In its 8 years of operation, total annual CO_{2eq} emission reduction by TurSEFF has been estimated to exceed 2 million tonnes. Yearly savings in CO_2 emissions in 2020 by the kfW Energy efficiency and Environmental Programme have been estimated at 2.8 MtCO_2e. Yearly savings in CO_2 by the German Investment Grants for the Use of Highly Efficient Cross Cutting Technologies are estimated to be 4.6 MtCO_2e in 2020. These figures must be interpreted with care, as there are other factors which may reinforce the positive environmental impact of schemes.

Multiplier effect

Multiplier effects of the economic support instruments tend to be quite high, although they vary across programs. From a highest of 1:14 in the UK ECA scheme (i.e. 14€ private investment for each euro deducted) to a lowest of 1:4 in Basque Country in

Spain (Elgorriaga A. and Quintana I., 2018) and in Germany (EPATEE, 2018). The MIA-VAMIL program shows an estimated incentive effect of €12 from the private sector for each tax deduction euro (Elgorriaga A. and Quintana I., 2018).

Cost per unit kWh or CO2 reduced

Overall the economic support schemes analysed tend to be cost effective, achieving average cost effectiveness between 0.0052 to 0.0379 €/kWh saved or between 15 to 30 €/ ton CO2 reduced.

Assuming a free-ridership level of 50% for the Netherlands IEA scheme and the UK ECA scheme, the cost-effectiveness was estimated to be € 0.02/kWh for the Netherlands and €0.0052 for the UK (Ryan et al. 2012). The cost per kWh saved in the German Investment Grants for the Use of Highly Efficient Cross-Cutting Technologies is estimated at 0.0379 €/kWh (EPATEE, 2018). These figures are below the average national industry price of electricity, indicating that the programs are cost-effective.

The Netherlands IEA program appears to have a cost of € 15-17 per ton CO_2 reduction, while the cost per ton saved is estimated at around € 15 in TurSEFF and at approximate € 30 per ton CO2 saved in PolSEFF. These figures are below the carbon prices recommended by the High-Level Commission on Carbon Prices, indicating that the programs are cost-effective.

Administrative cost

The administrative costs associated with the programs analysed do not appear to be high. Management costs of programs range from 0.3% of total budget for the BCTL to 1.3% of total budget for MIA and VAMIL, while the UK ECA program appears to have a management cost of 1.2% of total budget (Elgorriaga A. and Quintana I., 2018). Total administrative cost (i.e. not including grant cost) of the German Investment Grants for the Use of Highly Efficient Cross-Cutting Technologies funding program is estimated at 99,21€ per granted action (EPATEE, 2018).

Technology List

Most analysed programs have a central element in some-kind of Technology List, which appears to be quite important in both promoting the adoption of resource and/or energy efficient technologies by industry and developing the production of highly efficient technologies. The Lists contain the best technologies that are not widely used yet and need state support for further market penetration. They are updated frequently to ensure that the products on the list continue to keep in line with market developments. They are user-friendly, easy to use and unbureaucratic. The technology list plays a very important role in avoiding the technological lock-in.

Recommendations for economic push instruments in Russia

A well-designed incentives scheme would have the potential to provide additional finance to fill the existing financial gap in Russia. The analysis of the European experience with tax incentives, subsidies and loans programs suggests that at least two

key areas could be considered in the design of the Russia's incentive schemes for the BAT transition.

A simple and transparent procedure

A simple and transparent procedure to apply for loan or for claiming tax benefits/accelerated depreciation is an important feature, as it will reduce the administrative and reporting burden for the state and for the private sector. This was identified as one of the key barriers to the effectiveness and uptake of economic instruments to BAT in Russia.

It is recommended to create a Technology List, as it will simplify and accelerate procedures for both business and program managers while keeping the system transparent, credible and robust, and will reduce the bureaucratic and reporting burden to industry. The technology list will also play a very important role in avoiding the technological lock-in. Moreover, it will enable to balance the interests of technology producers and polluting enterprises.

This could be a newly created list or be based on the existing technology list based on the lists of BATs given in the industry information and technical reference books on BAT (BAT ITS). A well-designed BAT List should comply with certain rules: (ii) clear and relatively regular timeframe for updates; (ii) transparent procedure on how and by whom new technologies/ equipment can be proposed for the list; (iii) accessible through a usable website to all interested equipment manufacturers and dealers, financial institution staff, and SMEs.

Terms on which on which the existing enterprises could consider increasing their level of investment

In addition to a well-designed BAT list, a cost-effective tax incentive (accelerated depreciation and/or tax credit) or loan scheme would need to include an adequate level of tax incentives for different types of enterprises and types of spending and/or acceptable terms of loans.

Russian accelerated depreciation rates for BAT equipment are around 60% in year 1, which is in the middle range of the programs analysed (15% to 100%). It would be useful to undertake an overall assessment to find out whether enterprises will be responsive to this economic incentive or if a stronger incentive will be needed.

The general terms of loan of the development project and the leasing project of the State Fund for Industrial Development, with (i) quite short lending periods, (ii) high interest rates and (iii) quite high co-financing required, has direct implications on the feasibility and speed of transition to the BAT in Russia. Lower interest rates and/or longer-term lending periods will be needed to speed up implementation timelines. Lower co-financing requirement may also help.

The need for collateral deposit is also a barrier to get access to finance in Russia. Nearly all EU Member States as well as Turkey have set up Mutual Guarantee

Societies (MGS) to overcome this barrier. Exploring a Guarantee System in Russia is recommended

Conducting a survey to verify what changes in terms of loans (i.e. interest rate, lending period and co-financing required from the loan applicant) and/or in the level of tax incentives would increase the demand for investment to meet BAT requirements is recommended.

Strengthen the analytical basis around the cost of transition

The assessment of the terms on which the existing enterprises could consider increasing their level of investment could be complemented with a survey among companies to better understand the cost of BAT implementation in Russia. Additional sources of finance will also need to be identified. Capacity building is also needed.

Additional sources of finance

Russian legislation stipulates the provision of state support for business to protect the environment and introduces specific economic instruments to support the enterprises in adopting BATs. However, there is little information on the effectiveness of the current economic instruments in place. It is recommended to conduct a study on the effectiveness of these instruments and analyse if some of them can be adapted to be used as cost-effective sources of additional finance for the BAT.

The Government has recently approved the rules for granting subsidies to compensate companies for the coupon income on bonds issued as part of investment projects to introduce the BATs at category 1 facilities. To facilitate the application of the subsidies for coupon income and make the process more transparent for business, it is recommended that the Government develops a robust classification system to establish clarity on what BATs are eligible for the green bond subsidy.

It is recommended to assess the potential of linking some of the 13 national strategic priorities and the objectives of the BAT transition, so that a share of the 25 trillion roubles dedicated to those strategic priority areas up to 2024 can be used to promote BAT adoption.

Other instruments worth investigating include voluntary agreements to encourage resource efficiency in groups of businesses by creating shared goals, BAT implementation awards to adopting industry in order to build reputation, and research and development budget for Universities and Tech Centres aligned with BAT priorities.

Capacity building

There is also a need to strengthen capacity of the key actors on aspects of BAT implementation, to address the lack of successful experience at scale in Russia with economic instruments of stimulating investment and to provide streamlined information on what support is currently available and to what types of enterprises, what investments and which sectors.

2. Introduction and scope of the analysis

In this section the concept of BAT in the EU and in Russia is explained. Both the concept and the role of economic-push instruments in promoting BAT are also analysed. The scope of the study is described.

2.1. The concept of Best Available Techniques

Significant **environmental degradation** connected with economic development has occurred in the past and is expected to continue if no action is taken. This has led to increased attention, both to efficient use of energy and resources as well as to the adoption of cleaner technologies by industry. As part of this process a lot of countries have taken measures to promote **BAT,** involving cleaner or ´green´ technologies across **all economic sectors**, but especially for energy and resource efficiency.

The EU has developed a general framework based on **integrated permits** to prevent and control industrial emissions. The so-called Integrated Pollution Prevention and Control (IPPC) Directive[1]. It defined rules to prevent and control pollution into the air, water and land (soil), and to avoid generating waste from large industrial installations as well as to use resources efficiently. The permits take account of the complete environmental performance of a plant across air, water and land to avoid pollution being shifted from one environmental medium to another. In the design of permitting priority is given to pollution prevention.

An updated version of the IPPC Directive, published in 2010, the Industrial Emissions Directive (IED) 2010[2] is considered as the most relevant piece of EU legislation on industrial emissions. The concept of Best Available Techniques (BAT) was a key element of both the IPPC Directive and the IED and, thus, a key policy tool to prevent and control industrial emissions.

Article 3 of the IED defines best available techniques (BAT) as:

> "*the most effective and advanced stage in the development of activities and their methods of operation which indicates the practical suitability of particular techniques for providing the basis for emission limit values and other permit conditions designed to prevent and, where that is not practicable, to reduce emissions and the impact on the environment as a whole:* ***"techniques"*** *includes both the technology used and the way in which the installation is designed, built, maintained, operated and decommissioned; "****available techniques****" means those developed on a*

[1] Both Directive 96/61/EC of 24 September 1996 and Directive 2008/1/EC of the European Parliament and of the Council of 15 January 2008 concerning integrated pollution prevention and control is a directive of the European Union are known as the IPPC Directive.

[2] https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32010L0075&from=EN

> *scale which allows implementation in the relevant industrial sector, under economically and technically viable conditions, taking into consideration the costs and advantages, whether or not the techniques are used or produced inside the Member State in question, as long as they are reasonably accessible to the operator;* ***"best"*** *means most effective in achieving a high general level of protection of the environment as a whole.*"

Note that the definition has an economic dimension in taking account of the economic viability of the implementation of the techniques. In 2016, the European Commission developed the document "Integrated Pollution Prevention and Control Reference Document on Economics and Cross-Media Effects" to assist in the determination and selection of the most cost effective best available techniques, including a methodology to estimate the costs and benefits that need to be taken into account when determining BAT. In implementing BAT, however, economic viability has not been interpreted as requiring a full cost-benefit analysis of the adoption of a technology. As part of the exchange of information carried out in the framework of IED authorities have prepared the Best Available Techniques Reference Documents (BREFs)[3].

Although it is too early to see the practical results of the IED in Europe, trends in industrial emissions are promising. For example, the European leather tanning sector has substantially reduced its environmental impact: (i) local and regional leather tanning consortia have reached total pollution abatement levels of more than 93% for all main pollutants; (ii) the use of hazardous chemicals has been significantly reduced or eliminated; (iii) volatile organic compound (VOC) emissions have declined by 40%, with up to 38€ million in societal benefits; (iv) the member companies of the leather tanning association have reduced their water consumption by about 20% and improved waste recovery to 62-77% (OECD, 2018b).

Ex-post assessment in the iron and steel production sector has also proved that BAT implementation under the IED is cost-efficient (European Commission, 2018a). Table 2.1 summarises the estimated costs and benefits of fitting techniques to comply with BAT. The total estimated costs for the iron and still industry[4] are estimated to be 90€ million per year (total capital cost of 506€ million, and operating cost 52€ million per year). The monetised health and environmental benefits arising from the emissions reductions are greater than the estimated costs. When factoring all processes in the sector, the benefit-cost ratio is 10.4. BATs installed to reduce emissions from sinter strands (e.g. dust and SO_2) have the highest cost to operators.

[3] These documents can be accessed here: http://eippcb.jrc.ec.europa.eu/reference/.
[4] Estimation based on installations representing approximately two thirds of the industry on a capacity basis

Table 2.1: Costs and benefits of fitting techniques to comply with BAT

Process	Total annualised costs (€m/year)	Benefits (€m/year) of BAT compliance			Benefit-cost ratio
		Processes with reported emissions	Remaining processes (estimated emissions)	Total for all processes impacted	
Sinter plant	45.9	242	402	644	14.0
Pelletisation plants	7.7	6.8	-	6.8	0.9 *
Coke ovens	17.1	154	1	155	9.0
Blast furnaces	4.7	3.3	12.5	15.8	3.3
BOF	12.2	45.5	-	45.5	3.7
EAFs	2.0	2.1	63.4	65.5	33
TOTAL	89.6	453	479	932	10.4

Source: European Commission, 2018a *(* The results for pelletisation plants reflect a single Swedish installation)*

In the Russian Federation, a BAT-based policy to prevent and control industrial emissions was introduced in 2014, determined by amendments to the Federal Law on Environmental Protection and related legislative acts, including the Law on the Protection of the Atmospheric Air. The policy entered to force in 2018 (OECD, 2018a). However, investments in environmentally friendly technologies are still lagging in the country due to unfavourable environmental and economic policies.

Based on the EU experience and the specific features of the domestic economy in Russia, Federal Law No. 219-FZ introduced the following gradual transition to a technological regulation system based on the best available techniques (BATs):

- **2015-2018**: regulatory basis, norms and standards were developed and published, and enterprises that would need to be covered by the BAT regulation were registered.
- **2019-2022**: government will start issuing environmental permits based on improved environmental effectiveness for: (i) all new enterprises; (2) 300 of the largest polluting enterprises and (3) enterprises that voluntarily opt-in. This is also the period where implementation of measures that increase environmental effectiveness would start.
- **From 2025**: the requirements of the BAT law will apply to all large enterprises in the country.

2.2. The concept of economic push-instruments: the stick and the carrot

The stick

The ´stick´ refers to measures that impose a penalty for not complying with the BAT in a timely manner. In the EU, such penalties vary from country to country depending on effectiveness, proportionality and dissuasiveness. They can take the form of administrative or criminal sanctions: the first step is a warning, which is usually non-binding. Then orders can be issued to take steps to address the non-compliance, sometimes with a fine. Lastly, criminal sanctions may be applied. Criminal sanctions include fines ranging widely, from 1,200€ to as much as 15€ million and varying by country and severity of the damage. Imprisonment is also included as a last resort in most countries. However, evidence shows that in Europe the number of fines imposed is quite small: e.g. Netherlands data indicate about 2% of enterprises had a fine imposed.

The carrot

The ´carrot´ refers to measures that provide a fiscal incentive for compliance with BAT. This is usually in the form of a direct subsidy to make the investment or a subsidised credit on a loan (lower borrowing rates or tax credits) when making the investment.

Sticks versus carrots

A range of **economic instruments** for implementing BAT as well as green technologies and technologies for energy and resource efficiency have been implemented in **Europe**. The main pros and cons of both stick and carrot instruments are summarised in Table 2.2.

Table 2.2: Pros and cons of stick and carrot

Type of Incentive	Pros	Cons
Stick (Charges, Fines)	No cost to the budget, which gains Conforms to the Polluter Pay Principle	Charges need to be quite high to be effective Possible impact on employment and competitiveness
Carrot (Subsidies)	If well designed, it can have a leverage for every euro spent Avoids employment and loss of competitiveness	Cost to the budget Possible conflict with EU (State Aid) and WTO regulations

In general, subsidies that do not contradict state aid or World Trade Organisation (WTO) rules are a popular instrument for supporting pollution abatement in OECD

countries but in some areas (mostly waste and water), charges are having a positive effect on emissions. Table 2.3 below shows the number of different types of instruments in both OECD and non-OECD countries. Taxes, fees and charges are the dominant ´sticks´, while subsidies are the dominant ´carrots´. Among the sticks we have also a number of programs involving tradable permits. Of course, the biggest one in the EU is the CO_2 emissions trading scheme but there are a number of smaller ones involving permits between organization to meet targets for emissions of other pollutants. For example, if companies or utilities over-achieve their targets for energy efficiency or emissions reductions, they can ´sell´ the excess reduction to those companies or utilities that could not meet the target. Thus, the overall target is met more flexibly and at lower cost (Ellerman, 2003).

Table 2.3: No of Different Environmentally Related Instruments in OECD and Non-OECD Countries

Instrument	No in OECD Countries	No in Non-OECD Countries
´Sticks´		
Taxes	680	110
Fees & Charges	286	208
Tradable Permits	67	0
Deposit Refund Systems	50	14
´Carrots´		
Environmentally Motivated Subsidies	743	23
Voluntary Approaches	117	3

Source: OECD. Data are as of 2013. (https://www.oecd.org/env/tools-evaluation/env%20policy-natural%20resources%20brochure.pdf/)

In terms of revenues, the comparison between the carrot and stick instruments is more difficult as data are limited. The OECD has some data for environmental subsidies, but they are for selected years and information is incomplete for most countries. Revenues from the stick instruments are mainly from transport taxes on vehicles and energy taxes for gasoline, diesel etc. If we exclude transport taxes, which have long been justified as a charge for the use of roads, the relative figures for Denmark, Germany and the Netherlands are shown in the Table 2.4 below. The share of subsidies varies from one in percent of environmental taxes in Germany to nearly 12 percent of environmental taxes in the Netherlands. Subsidies in these countries cover a range of areas. In Denmark, for instance, eligible items are technology development, including testing and demonstration of technologies reducing particle emissions, phasing out of wood boilers, and small grants for green agriculture. In Germany the items included

are capital investment grants, while in the Netherlands the program is entirely made up of grants for the production of renewable energy.

Table 2.4: Environmentally Motivated Subsidies and Environment Taxes Excluding Transport Taxes (Euros Million)

	Environmental Subsidies	Environmental Taxes	Subsidy/ Tax	Years
Denmark	59	5,939	1.0%	2008-2009
Germany	610	49,015	1.2%	2013
Netherlands	1,700	14,672	11.6%	2012

Source: OECD and Eurostat. Data for subsidies are only available for selected years.

Although there is a lot of literature on the number of different instruments used in EU and OECD countries, there is limited information on their overall effectiveness. The cases that have been spectacularly successful have been deposit refund schemes and taxes on plastic bags (EEA, 2016). The taxes on solid waste to landfills in the UK also reduced amounts of waste significantly (IIEP, 2016). On the other hand, pollution charges on emissions to air and water have had a less measured impact (there are very few careful studies of this as EEA, 2016 points out). The main reason for most emissions not being effective has been the relatively low level of charges relative to the costs of abatement. If the charge per ton is less than it costs to reduce one ton of emissions, polluters will prefer to pay the charge rather than reduce emissions. Recently, some European cities have deployed much higher levels of charges on vehicles entering the city centre. These have had a significant effect on emissions: for example, in the case of London, a congestion charge of 9.1€ a day introduced in 2003 has led to a 16% reduction in CO_2 emissions according to a C40Cities estimate.[5]

2.3. The role of economic-push instruments to encourage environmental technologies

BAT is a regulatory instrument which mandates enterprises to adopt certain technologies or techniques. Enterprises have no choice. They must comply or face sanctions such as fines, criminal sanctions and even closure. This is different from economic instruments that leave open the choice of technology but provide an incentive to reduce emissions. For example, an emissions charge for a pollutant such as SO_2 means an enterprise can generate as many emissions as long as it pays the charge.

Encouraging BAT in the industrial sector requires policy measures and incentives that are flexible and easily accessible by companies. Different types of measures exist, including economic instruments (the carrot and stick mentioned above), but also behavioural measures, education and information, regulatory instruments, research and development, and voluntary approaches (European Commission, 2007). Among

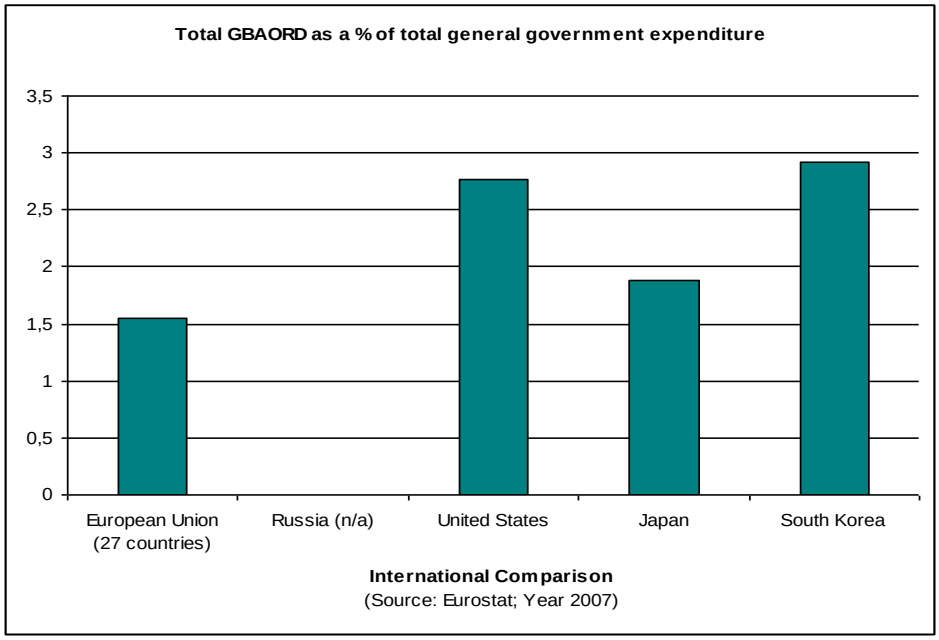
[5] https://www.c40.org/case_studies/londons-congestion-charge-cuts-co2-emissions-by-16.

economic instruments, different categories can be found including public loans/loan guarantees; publicly owned equity; prices; tax credits and other benefits related to investments; grants and contracts.

The review of literature on economic push instruments for environmental policy and for encouraging (research, development and implementation) of BATs in the EU and Russia will provide guidance on how the adoption of BAT can be facilitated through a number of economic instruments.

The discussion in this chapter focuses mainly on instruments related to the implementation of BAT. However, before focussing on implementation it is worthwhile to mention the role of instruments to support the development of new technologies that are both cleaner and less costly than existing ones. These mainly take the form of grants and subsidies for research and development (R&D)[6]. The budgets for R&D are substantial, at around 1.5% of all government expenditure in the EU27 (but they are even higher in the US and Japan and Korea, see Figure 2.1 below).

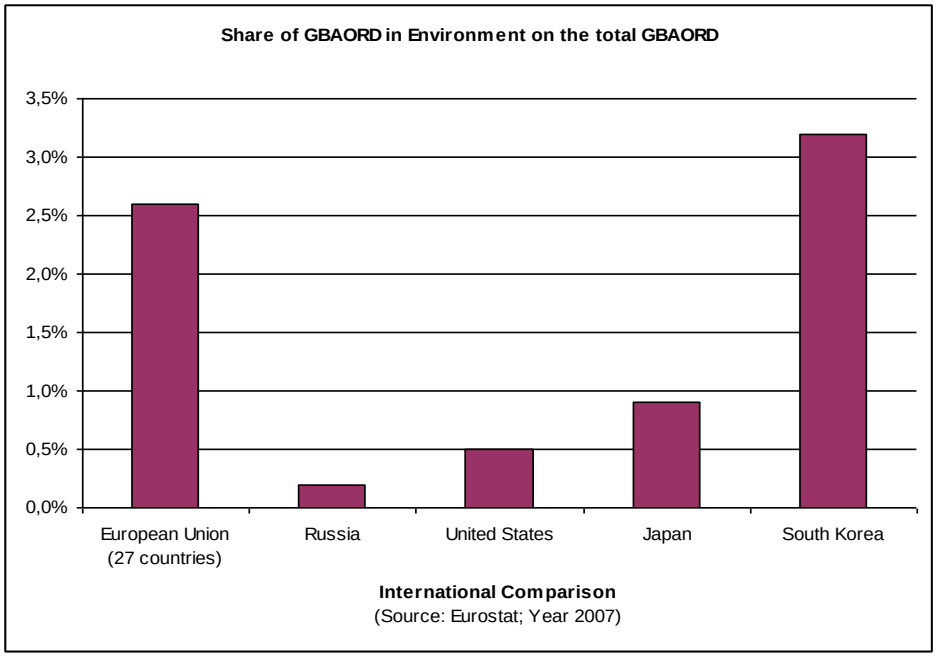
Figure 2.1: Total GBAORD as a % of Total Government Expenditure



The amount of this allocated for environmental issues, however, is small – at around 2.5% of the total. In this case, it should be noted that the EU is more in the lead, having the 2nd highest share of R&D for the environment after Korea. (See Figure 2.2).

[6] The acronym GBAORD refers to Government Budget Appropriations on R&D.

Figure 2.2: Share of GBAORD on Environment as % of Total GBAORD



Evaluation of the R&D budgets in the EU in terms of technology development is limited. Some studies indicate that EU-funded research contributed substantially to building up research in the environmental field by creating strong networks with excellent institutions, while ensuring access of new organisations. However, it has not been so effective in industrial exploitation of the results and the involvement of private sector has been limited, a fact acknowledged by the European Commission (EC)[7]. At the same time the EU is considered worldwide as a leader in eco-technology, partly as a result of public support in R&D.

The stick versus the carrot in implementing BAT

The number of installations that came under EU IPPC were estimated at around 50,000 when it came into force in 1999 and the number has undoubtedly grown since then. The Directive applies to the following six categories of industries: (a) energy, (b) production and processing of metals, (c) minerals, (d) chemicals, (e) waste management; and (f) 'other'. The 'other' group includes facilities operating in the areas of pulp and paper production, textile treatment, tanning, food production and the intensive rearing of poultry and pigs.

Similar instruments were used in the US, where BAT based standards were introduced in the late 1970s and came into force in 1983. Estimates were made of the costs of

[7] EC: Group of Experts "Appraisal of ex ante impact assessment tools for research for the environment" Final report Study. https://publications.europa.eu/en/publication-detail/-/publication/1c6e3092-217c-45ec-bfff-0540bed04a3d/language-en.

meeting these standards, both *ex ante* and then after they were met (*ex post)*[8]. The average *ex ante* capital cost was estimated at US$5,418 million (4,640€ million) per year for 13 years and the corresponding operational cost was estimated US$22,250 million (19,000€ million). In practice the cost turned out considerably lower: the annual capital costs were around $3,400 million (2,900€ million) and the annual operating costs around US$10,220 million (8,750€ million). That is, capital cost was only 63% of the expected amount and operating cost only 46% of the estimated *ex ante*.

There is no similar estimate of the costs of BAT for the EU BAT program but there are estimates for selected countries of the costs of pollution abatement after the BAT and other regulations were in force. Table 2.5 compares these costs for EU member states France, Germany and the UK, with other OECD countries and Brazil. One remarkable feature is how similar the costs are as a percent of manufacturing value added. In all but two cases (Canada and Mexico), they lie between 0.9% and 1.3% of manufacturing value-added[9].

The rate of compliance with the BAT directives has generally been quite high in the EU, although for some new regulations some problems are emerging[10].

Table 2.5: Costs of Pollution Abatement in the Manufacturing Sector 2014

Country	Total Cost €Bn.	% of Manuf. VA
Canada	3.8	2.2
Germany	8.0	1.3
Korea	3.7	1.3
USA	22.5	1.2
Japan	11.7	1.2
France	2.3	1.1
Brazil	2.6	1.1
UK	1.9	0.9
Mexico	1.5	0.8

Source: https://mapifoundation.org/economic/2015/3/6/an-international-comparison-of-pollution-abatement-and-waste-management-costs

[8] W. Harrington, R. D. Morgenstern, T. Sterner (2010) Choosing Environmental Policy: Comparing Instruments and Outcomes in the United States and Europe. Routledge 296 pages. Costs have been updated to 2018 prices.

[9] The figures in the table in euros are somewhat higher for the US than the earlier study by Harrington et al. (2010). This may be due to the different periods (the table includes more recent regulations) and the fact that the table costs are based on EPA *ex ante* estimates of pollution reduction.

[10] For example, about 82% of EU, 80% German and virtually all Polish coal power plants do not comply with a new EU regulation on industry air pollution emissions standards that they need to meet by 2021. https://climateanalytics.org/briefings/about-80-of-eu-and-german-virtually-all-polish-coal-plants-non-compliant-with-new-eu-2021-air-pollution-regulations/.

As mentioned earlier, to get timely compliance both stick-type economic instruments, such as fines or pollution charges, and carrot-type instruments, such as subsidies, could be used.

As far as we are aware, the effectiveness of these measures has not been analysed in the BAT context anywhere. With an emissions charge, for example, enterprises have an incentive to adopt BAT early in order to avoid paying the charge. But the size of the charge may have to be quite high to be effective, compared to the kind of charges typically levied in the EU. As an illustration of this, we show in the box below an example of the size of tax rates needed to provide an incentive in the case of the requirement to install Flue Gas Desulphurisation.

Box 2.1: Impact of Pollution Charges on Advancing BAT

How Much Would Pollution Charges Alter the Decision to Install Flue Gas Desulphurisation (FGD), Selective Catalytic Reduction (SCR) and adopt the use of low sulphur coal as mandated by the BAT regulations?

The following calculations are based on data from BAT calculations in Scotland.

A 200MW coal plant will find costs of operating with BAT requirements (capital and operating costs all annualised) come to about 19€/MWh.

The adoption of BAT will reduce emissions of SO_2, NO_x and PM. Amounts of emissions reductions will save taxes that have to be paid for those emissions.

The calculations show that to advance installation by 1-2 years due to taxes saved the charge rates per metric ton would have to be in the region of 4,950€ for SO_2, 5,030€ for NO_x and 20,400€ for PM. These rates reflect the damages done by the pollutants as estimated by various EU studies but note that they are much higher than the taxes actually imposed in any EU countries, or indeed in the Russian Federation.

Source: https://www2.gov.scot/Publications/2003/07/17679/23171

Going on to look at the situation in the Russian Federation, data on the effects of instruments for promoting BAT are very limited. It has been noted, however, that the new scheme for emission charges which is being introduced under the new BAT policy, creates a larger difference between compliant and non-compliant industries in terms of the level of fees. This could be an important incentive for Russian industries to improve their environmental performance by implementing BAT, but no evidence has been seen to show this is the case.

The carrot

The alternative to the stick is the carrot – a subsidy for the adoption of BAT technologies. In the EU, there have been no direct subsidies specifically tied to adoption of BAT. However, there are some subsidies to support cleaner technologies in general, in most cases, aiming at supporting early implementation before any technology or technique becomes a BAT. They usually take the form of soft loans, partial grants or tax write-offs. Lately, a major focus for subsidies has been energy efficiency and Greenhouse Gas (GHG) reduction rather than generally reducing environmental pollution.

Data from Germany, Netherlands and Spain reveal the following amounts in the form of soft loans or tax credits to support environmental investments:

- In Germany, the Federal Ministry for Economic Affairs and Energy (BMWi) assigned 120€ million in 2017 (same as in previous year) to the grant measure "support of cross-cutting technologies" (EPATEE, 2018). As percentage of total national expenditure on environment it was around 2%.

- In Netherlands VAMIL and MIA programmes made 137€ million in tax credits available in 2016 (The Netherlands Enterprise Agency, 2017). As percentage of total national expenditure on environment it was about 6%.

- The Basque Country (Spain), gives corporate tax deductions of 30% of the investment cost of the equipment included in the Basque Technology List for companies registered in the region (Elgorriaga A. and Quintana I., 2018).

The effectiveness of these instruments has only been partially evaluated. For instance, estimates of the multiplier effect in the Netherlands suggest a 1:12 (i.e. for every euro spent on subsidised loan the amount by which expenditure increased was 12 times). In the Basque Country, estimates of the multiplier effect was 1:4 (i.e. for every euro spent on subsidised loan the amount by which expenditure increases is 4 times) (Elgorriaga A. and Quintana I., 2018).

Effectiveness can vary across these instruments for many reasons. The degree to which subsidies are targeted to enterprises that would otherwise not make the investment is a key factor. Often subsidy programs provide soft loans or funds to companies that would have undertaken the investment in any case, which makes the subsidy a pure benefit to them and does not increase compliance. Related to that are the terms of the subsidy: if they are too soft, a given budget will cover support relatively few companies and there will be excess demand for the support; if they are too hard, the demand will be low and the uptake will be limited. Then there is also the quality of the risk assessment in making subsidized loans. If borrowers default it typically means the investment in clean technology has not been effective and recycling of the funds for further loans is reduced.

It is also important to compare the size of the subsidy program with the amount of investment that is required to comply with the pollution abatement regulations. The figures for Germany indicate that the annual expenditure on abatement in manufacturing was of the order of 8€ billion while subsidies in the form of investment grants and loans were of the order of 585€ million to 600€ million. That is subsidies were close to 75 % of the annual cost of pollution abatement for manufacturing[11]. In other OECD countries the figures are also low compared to abatement costs. In the UK subsidies for pollution control for business were virtually non-existent, while in the USA they amounted to around half a billion euros. Note that a significant subsidy support in OECD countries is directed to households for improvements in energy efficiency and adoption of cleaner technologies rather than to enterprises to meet BAT standards (OECD, 2017a).

2.4. Rationale (key arguments) for selecting an effective and efficient mix of economic push instruments

The main criteria for selecting the instruments to promote BAT is to achieve compliance in a timely manner (i.e. as quickly as possible) and at least cost to the government and to the enterprises respectively. In the case of the stick the level of charges on emissions can be raised but, as the example in Box 2.1 shows, these may need to be raised very high to provide enough incentive to advance the implementation of BAT by even 1-2 years. Arguments against this instrument would be the potential loss of competitiveness for the firms involved and a possible impact on employment. Based on the data presented earlier, a benchmark that could be used to limit the impact on competitiveness is **not to push the cost of environmental regulation much above one percent of the value of manufacturing value added**, which is the figure that most large economies face with respect to environmental costs.

In the case of the carrot, the key idea is **to lower the cost of advanced implementation enough so that the enterprise finds it profitable to go for that option**. At the same time, **to keep the costs to the government at a minimum, the lowering of costs should be just enough to make the early implementation the option of choice**. Any additional lowering of costs would simply be a transfer to the surplus of the enterprises and would add to the government´s budget. The **key parameters that determine the subsidies are the market rate of interest that enterprises face and the delay period that is available to them**. The relation between these factors and the critical subsidized interest rate and the loan period are shown in Annex 1. The Table 2.6 below shows the results of solving the equations set out in the annex to determine the critical values.

[11] The 7.5% figure for manufacturing is lower than the 9% figure for all environmental expenditure given above because of differences in definition of environmental expenditures.

Table 2.6: Minimum Subsidized Interest Rates that Make Early Adoption the Preferred Option for BAT Implementation

Delay Period	Years	3	5	3	5
Period of Loan	Years	10	10	15	15
Market Rate for Money	%	15	15	15	15
Critical Subsidized Loan Rate	%	3.02	n.a.	6.12	1.51

Source: Own Calculations

The table shows that if a 3-year delay is permitted and the market rate of money for the enterprise is 15% (as has been the case in the Russian Federation) then a 10 year subsidized loan would encourage implementation of the investment today if the subsidized rate was 3.02%. If the delay period is as high as 5 years, then no subsidized rate would support early implementation. If, on the other hand the period of the loan is 15 years then the subsidized rate on the loan can be 6.12% in the case of a 3-year delay and 1.51% in the case of a 5-year delay. Note that the longer the loan period the higher can be the rate for the subsidized loan and the higher the money market rate for the enterprise, the higher can be the rate for the subsidized loan.

In practice other factors, will also play a part in the decisions. One particularly important factor is the difference in cost of operating the plant with and without BAT. If BAT raises operating costs that will lower the critical discount rate and vice versa. This can be added to the calculations described here without much difficulty. Another factor will be default experience with similar loans; if this has been the case in some sectors it may be necessary to reflect that in the offered rate for new loans. A third factor is the presence of pollution charges. If such charges exist, this will mean that the cost of going for earlier implementation will fall and the critical loan rate can be a little higher. Again, this calculation can be done quite easily by modifying the formula set out in the annex and give a good indication of how the instrument can be designed.

Other important factors that will influence the choice of instruments and the values chosen include:

- Fairness: if subsidies are given to enterprises only if they fall below a threshold of economic or environmental efficiency, then those who are above that level and do not get the subsidy feel discriminated against. This is particularly strong for enterprises just above the threshold. Some element of targeting is of course needed as funds are limited but it will be important to keep the subsidy to the minimum needed to ensure compliance. It may also be necessary to have a graduated support program, where the amount of subsidy does not fall to zero at a threshold but declines gradually as enterprise efficiency levels increase.
- Leverage effects: the award to a subsidized loan from the government may signal to commercial banks that due diligence has been carried out on the investment and on the enterprise by the regulatory authorities. This in turn will encourage them to

make loans, thus creating a leverage effect. That is, for every euro or dollar of public money, additional private resources will be mobilised. As noted above this multiplier effect can be very significant. There is no need, however, for the subsidized rate to be further reduced below the critical value to get the advantage of such leverage.

- Free-riding and spill-over effects: free-riding is the phenomenon of purchasers taking advantage of an incentive even though they would have taken the decision (e.g. adopt a BAT) in the absence of the instrument. This means that the incentive is granted to stakeholders who did not really need it. This affects cost-efficiency of these programmes (see above). On the other hand, there can be spill-over effects that mitigate free-riding. It is possible that even when firms are benefitting from an incentive for a purchase they would have made anyway, they have more cash flow to invest in other projects they could not make before. An incentive can thus have a spill over and multiplier effect towards other energy efficiency investments.
- Issues of Implementation: A key difference between the carrot-type instruments and stick-type ones is scope of fraud. This is a very important issue to consider. With a pollution tax, there is limited scope for evasion of payments while with a subsidized loan scheme or something similar there is more scope for the loans to be used for other purposes. This kind of ´leakage´ from subsidy scheme is a problem and needs good governance to avoid it.
- Experience with similar instruments in other countries: Most regulatory authorities will want to learn from experience with the instruments in other countries before designing their own instruments or transferring others. This is quite appropriate approach. Policy makers appear to be increasingly relying upon policy transfer (Dolowitz and Marsh, 2000)[12], but the transfer process does not necessarily lead to success. If we want the policy transfer process to be successful, the reasons behind policy transfer success need to be fully understood. As argued by Minkman et al (2018)[13], policy transfer processes are more easily established when:
    - The adopting/ receiving actor has a positive image of the source actor. Closely connected to this is its legitimacy to transfer.
    - Relations between source, adopting and third-party actors already exist.
    - The adopting actor has tolerance and openness to consider policies from elsewhere. Openness is necessary but not sufficient as adopting actors must also have decision-making power.
    - The policy to be transferred matches the political objectives of the receiving actor and fit within its institutional context. Proven effectiveness

[12] P. Dolowitz, David & Marsh, David. (2000). Learning from abroad: The role of policy transfer in contemporary policy-making. Governance. 13. 5 - 23. 10.1111/0952-1895.00121.

[13] Minkman, Ellen & Van Buuren, Arwin & Bekkers, V. (2018). Policy transfer routes: an evidence-based conceptual model to explain policy adoption. Policy Studies. 39. 222-250. 10.1080/01442872.2018.1451503.

and success of the policy to be transferred is also important, as this is justified by their perceived success.

Relations to various actors in the form of building coalitions and engaging all key actors are essential in the process design. An adopted policy can fail in the final implementation phase if support from executive officials was not secured in early phases. Adaptation of policies to the local context is also very important. Moreover, simple or simplified policies will require less organizational capacity and are less prone to failure. It should not be forgotten that sufficient resources (time, human, financial) are needed to adopt and integrate a transferred policy. Last but not least, policy makers should remember that the aim of the exercise is not only to create an instrument or set of instruments that help implement a few implementations of BAT; rather it is to create mechanisms that will help modernize the economy.

2.5. Scope of the study

The aim of this report is to provide guidance to the Government of Russia on what role different economic instruments could play in promoting the implementation of BAT regulations, drawing on the experience in the EU and particularly in Germany and the Baltic states. The document is structured as follows: This **second chapter** has described the BAT regulations and the different pathways through which their implementation might be influenced by economic push instruments. The latter are divided into the carrot and the stick-type instruments and their pros and cons are discussed. Specific issues in transposing the experience to the Russian Federation are also discussed. The **next chapter** goes into details on the Russian regulatory, financial, technological and socio-economic context and discusses how it is relevant for the use of different economic instruments. **Chapter 4** provides a detailed review of the use of economic push-instruments for research and development as well as for the implementation of BATs in EU member states, including Germany. **Chapter 5** offers some proposals for an effective and efficient mix of economic push instruments in Russia in pursuit of BAT along with the selection of the ´right´ technologies to be introduced under BAT in the country. Finally, **Chapter 6** concludes the report with key findings and areas where further information is needed.

3. The Russian regulatory, financial, technological and socio-economic context relevant for designing economic push-instruments

This chapter provides a brief overview of the regulatory, financial, technological and socio-economic context in Russia relevant for designing new and implementing the existing economic instruments to speed-up BAT adoption. It is based on the review of literature, and on the analysis of the input received at the interactive workshop with experts from the public sector, academic institutions and the private sector held in Moscow in March 2019, and through the individual interviews and written submissions from the experts working on the BAT and related issues in Russia.

3.1. Regulatory basis for BAT in Russia

Early efforts

The concept of low waste (and no waste) technologies and techniques was introduced in the Soviet Union the 1980s. The State Committee for Science and Technology at the time became responsible for promoting such technologies and making sure they are implemented at major industrial installations where economically feasible and applicable under regional conditions (Skobelev et al, 2018).

In the early 1990s Russia introduced the system of environmental pollution charges to encourage environmental protection and raise funds to compensate for environmental damage (see Box 3.1). Initially, pollution charges were managed by the territorial bodies of the federal environmental agency, with 10% going to the federal budget and the rest to the federal, regional and local environmental funds (Solovyeva, 2019). In 2000 the responsibility for collection of charges was transferred to the federal tax authorities, while the federal, regional and local environmental funds ceased to exist. The transfer of the revenue collection powers to tax authorities significantly raised the collected amounts but made the legal status of pollution charges more ambiguous (ibid).

However, there is a large gap between the formal environmental laws and state agency capacity and interest in enforcing them (Newella and Henry, 2017). While the national environmental norms and standards are generally strict, the system for establishing pollution limits at the enterprise level is quite “relaxed” (Romanov, 2016). The level of charges was low and did not stimulate entities to introduce “greener” technologies. The lack of economic incentives, coupled with the lack of credible information on the levels of pollution and low monitoring and enforcement capacity of the environmental authorities led to the system being ineffective (Romanov, 2016; Newella and Henry, 2017).

Legislation targeting BAT transition

The legislative basis for the introduction of the BATs in Russia was set through the Federal Law No. 219-FZ on 'Amendments to the Federal Law No. 7-FZ "On Environmental Protection" from 2012 and to the other legal acts in the Russian Federation', including the Law on the Protection of the Atmospheric Air. The law was adopted in July 2014 and entered into force in January 2015 (OECD, 2017; Ministry of Environment and Natural Resources, 2019). The law 219-FZ touches almost all areas of regulation of environmental impact, including environmental assessments, environmental permitting, charges for negative environmental impact and state environmental monitoring and control. The law amends not only environmental legislation, but also the Tax Code, Town Planning Code and the Code on Administrative Violations. Effectively the law introduces a regulatory system for gradual transition to the BATs and Integrated Environmental Permits (IEP) in Russia (Skobelev et al, 2018).

The law defines BAT as:

> "*The technology for manufacturing products (goods), handling operations (works), provision of services, identified on the basis of modern scientific (research) and engineering achievements, a combination (balancing) of the environmental protection criteria and considering technical opportunities for the implementation*" (Article 1, Federal Law No. 219-FZ).

Box 3.1: Environmental pollution charges in Russia

There are several laws, which impose environmental protection fees or charges to compensate for the negative effect a certain activity has on the environment. Such laws include the Federal Law of 10.01.2002 No. 7-FZ "On the Protection of the Environment", the Law of the Russian Federation of 21.02.1992 No. 2395-1 "On Subsoil", the Federal Law of 24.04.1995 No. 52-FZ "On Animal World" (art. 52), the Federal Law of 20.12.2004 No. 166-FZ "On Fishing and Conservation of Water Biological Resources", the Tax Code of Russia, the Water Code of Russia, the Forest Code of Russia, the Land Code of Russia, etc. There are also subordinate acts regulating order of payment of such duties.

Two types of fees are set for causing a negative effect (No. 632 of 28 March 1992):

- for emissions and discharges of pollutants, disposal of wastes, and other kinds of harmful effects *within acceptable limits/levels*;
- for emissions and discharges of pollutants, disposal of wastes, and other kinds of harmful effects *within temporarily approved limits/levels*.

The latter are paid if an enterprise exceeds the admissible limits of emissions, and then only for the amount by which they are exceeded. In those cases, the emitter pays five times the amount of the norms. One must pay the same amount (five times the norm) if harm is caused without having obtained a permit.

The rates are set by Government's Resolution No. 913 dated 13 September 2016. As an incentive, it is prescribed to apply the 0 coefficient to the fee rates for the emissions or discharges of pollutants within the technological standards after the implementation of the BATs.

Making a payment for environmental pollution does not relieve the user of natural resources from the need to take measures to protect the environment and to make a rational use of natural resources, nor from full compensation for harm caused to the natural environment, life and property of individuals by environmental pollution, in accordance with current legislation. In 2017, the environmental fees amounted to RUB 14.2 billion (or EUR 215.8 million), while the maximum revenue of RUB 26.8 billion (396.6 million) was reached in 2015[14].

Source: Adapted from Solovyeva, 2019.

The law No. 219-FZ further introduced the IEPs in Russia, which replace the previous system of several types of environmental permits. One of the key features of the law is the classification of enterprises into four categories depending on the level of their adverse environmental impact and application of the differentiated regulatory requirements to each category. Operators of industrial facilities of the 1st category, which are facilities with significant negative environmental impact, from January 1, 2019 must apply for integrated environmental permits based on the principles of the BAT. Operators in the 2nd category, which are facilities with moderate environmental impact, must declare their environmental impact and assess it against maximum allowable emission limits. They may apply the BAT on a voluntary basis. Installations that cause minimal and insignificant environmental impact are awarded categories 3 and 4 respectively. Category 3 enterprises should report on their emissions and discharge, while category 4 enterprises are not required to take any measures under this law.

Due to the concerns about the costs of the BAT transition and the strong opposition from the Russian business, the following phased timeline for the implementation of the key provisions of the law in respect to the BAT was agreed:

- 2019-2022: Issuance of complex environmental permits on the basis of the programmes of improving environmental effectiveness for (i) the new enterprises; (ii) 300 largest acting emitters, who are responsible for about 60% of total emissions; (iii) for the enterprises of other categories who choose to register voluntarily.
- 2025: BAT regulation applies to all large enterprises. All remaining enterprises therefore need to submit their applications for the IEP by the end of 2024.

[14] Nominal historic currency exchange used throughout this chapter, based on UNCTAD's data available at: https://unctadstat.unctad.org/wds/TableViewer/tableView.aspx (Accessed on 23 may 2019).

- From 2019 onwards: Implementation of programmes to improve environmental effectiveness.

In 2015–2017 the Reference Documents on BAT (Russian BREFs) have been developed and adopted for the Russian Category I enterprises, which are like IPPC/IED Annex I but reflect the specific characteristics of the national economy (Skobelev et al, 2018; see Box 3.2 for more information).

The law also introduced a register of polluting enterprises, improvements to the system of state and enterprise-level monitoring and control, reformed the system of environmental charges and economic measures to stimulate transition to the BAT, as discussed in more detail below.

Enterprises that are not in full compliance with the requirements for BAT transition, but that can demonstrate that they have put a place a programme for BAT transition and have undertaken the steps and developed future plan to implement it, may be granted a temporary permit with additional obligations. Such enterprises would be closely monitored and are expected to be in compliance with BAT transition by the end of the period of validity of the temporary permit.

Box 3.2: Defining BATs in Russia

The development and updating of the national reference documents on BAT (BREFs) is carried out by the Russia's National Bureau for Best Available Techniques (http://burondt.ru/), an agency created under the Ministry of Industry and Trade and Rostandart (national standardization body). In accordance with the decision of the Government from 31.10.2014 N. 2178, in total 51 Best available techniques documents (BREFs) (38 sectoral and 12 cross-sectoral) have been published and approved (Ministry of Environment and Natural Resources of Russia, 2019).

The criteria applied to defining BATs in Russia for category 1 enterprises are similar to those introduced by the EU's Industrial Emissions Directive. Specifically, they are:

- minimum level of negative environmental impact assessed through emissions factors (specific values) per time unit or per production capacity (quantity) of products manufactured, operations handled, services provided, or other parameters envisaged by the international agreements signed by Russia;
- economic efficiency of BAT implementation and operation;
- application of resource and energy efficient techniques (methods);
- implementation period;
- industrial adoption (use) at two or more installations causing negative environmental impacts (Skobelev et al, 2018).

Information and technical reference document on BAT is a standardization document drawn up as the result of analysing technological, technical and managerial solutions applied in the defined implementation area and containing descriptions of already implemented and prospective technological processes, technical means, methods applicable for preventing and reducing negative environmental impacts; techniques (solutions) recognised as the best ones are selected from the described (technological, technical and managerial) solutions (Skobelev et al, 2018).

3.2. Economic instruments for BAT in Russia

The initial legislative basis for the state support to environmental activities is provided by the Federal Law No. 7-FZ dated 10 January 2002 "On Environmental Protection". Article 17 "State Support for Economic and/or Other Activities Carried Out in Order to Protect the Environment" stipulates that the state provides support for economic and/or other activities carried out by legal entities and individual entrepreneurs in order to protect the environment. State support areas include assistance in investment activities aimed at implementing best available technologies and taking other measures to reduce the environmental impact (Solovyeva, 2019).

A report by the World Bank (Damianova et al, 2018) estimated that implementing BAT in Russia would require funding in the neighbourhood of 4 – 8 trillion RUB, equivalent to about 5.39 – 10.78€ billion. According to an assessment by the Ministry of Industry and Trade, transition to the BAT based on the published BREFs in Russia for category 1 enterprises would require investments of 8.2 trillion RUB (in 2016 prices), equivalent to about 11.05€ billion. The same analysis also showed that for the majority of sectors the assessed level of investment into the BAT would not exceed historically observed level of capital investment (Ministry of Environment and Natural Resources of Russia, 2019)[15]. Research on the assessment of the cost of transition to BAT for the energy industry conducted by the Research Institute "Centre for Environmental Industrial Policy" and the Scientific Research University "Moscow Power Engineering Institute" (Kondratyeva et al., 2019) showed that the level of such costs for energy sector can be about 100 billion roubles. Considering that at the moment in Russia 33 industries are defined to apply BAT, the total value of 8.2 trillion roubles seems to be overpriced, according to Kondratyeva (analytical note submitted for this project).

Overall, the government expects that implementation of the BAT principles would not only lower the negative environmental impacts, but also become one of the key

[15] Based on the percentage differences between the *ex-ante* and *ex post* mentioned in chapter 2, these figures could be *ex-post* on the range of 3.4 to 6.7€ billion 6.9€ billion.

instruments of import substitution and improving competitiveness of the Russia industry, and facilitate innovative development.

In this context, the law 219-FZ in 2014 and other relevant legislative documents introduce a number of specific economic instruments to facilitate the transition and to support the enterprises in adopting BATs.

'Sticks' or Penalties:

Pollutions or environmental damage fines: In recent years the fines for violations of the laws on subsoil resources have increased and the total compensation claimed for environmental damages increased from RUB 0.17 billion in 2007 to RUB 2.07 billion in 2017 (19.9€ million and 31.5€ million respectively) (Solovyeva, 2019). These growing fines, unlike charges for environmental resources, are a significant threat to a company's economic affairs.

In the context of the BAT legislations, fines will be increased by factor of 25 for temporality permitted impact and up to a factor of 100 when BAT implementation timelines are violated. These fine increases are comparable to the levels of the cost of pollution control for the enterprises that reject BAT implementation (Alexandrov, 2016). Furthermore, new administrative sanctions for a failure to comply with the newly established requirements in the forms of administrative fines in the amount up to 100,000 RUB (1,326.9€) have been introduced as well[16] .

Moreover, federal laws and laws of the constituent entities of Russian Federation may prescribe other measures of state support for economic activities carried out for the purpose of environmental protection, at the expense of the federal budget and budgets of the constituent entities.

'Carrots' or incentives:

Adjustments to the environmental charges system: The environmental protection charge can be seen as one of the areas of indirect state support for the implementation of BATs. However, their effectiveness depends on how high they are in relation to the cost of implementing BAT for companies. Pollution charges were thought to be high enough to compensate for economic damage caused by environmental pollution, but low basic rates for pollution charges in Russia did not compensate for economic damage and had little impact on changing behaviour of companies. Recently the Government revised the level of charges and fines and introduced multiplier coefficients (Law 291-FZ; Decisions by the Government from 13 September 2016 N. 913 and from 3 March 2017 N. 255; see Box 3.1).

In the context of BAT implementation, the costs for pollution abatement and BAT application can now be deducted from the environmental charges, including exemptions from payment of the charges after the adoption of the BATs.

[16] EnforEuro exchange rate used.

Environmental charges can also be deducted from the overall tax obligations (Begak, 2017; Alexandrov, 2016),

Currently, the environmental impact fee is purely fiscal in nature, and is an item of replenishment of the state budget. Total revenues from the use of natural resources and environmental management form about half of all the federal budget revenues and their growth significantly outstripped the increase in other revenue items in the last decade However it accounts for only a minor share of total costs of enterprises. It is estimated that the share of pollution charges on average will not exceed 0.07% in the operational costs and 0.5% in profits, which means the above measures are unlikely to provide a major economic incentive for the BATs by itself (Solovyeva, 2019).

Tax and investment credits and incentives: The Russian legislation foresees a range of special tax regimes and tax concessions (see Box 3.3). Tax benefits at the federal level are regulated by the Tax Code. Federal laws also determine the procedure for granting tax benefits for special economic zones. At regional level, constituent entities may grant tax benefits within the limits prescribed by the Tax Code.

Box 3.3: Legislative bases for tax benefits in Russia

Potential tax benefits under the Tax Code include:

- reduction of tax rates (as low as zero),
- exemption from taxation for certain categories of payers,
- exclusion of certain items from the taxable base,
- reduction of the taxable base due to deductions (social or investment),
- deferral or instalment payment of taxes, and
- tax credits (Tax Code art. 66 and 67).

Tax benefits serve economic, budgetary and social goals, including benefits for income, VAT or property tax. Great importance in encouraging corporate activities is given to the use of accelerated depreciation of fixed and intangible assets, accounting of R&D costs. Regional and local taxes also play a role in reducing tax burden. Residents of innovation centres and special economic zones enjoy a range of tax exemptions, including lower profit tax, accelerated depreciations, more beneficial treatment of R&D costs, land tax exemptions or corporate property tax exemption.

A shortfall of Russia's budget revenues as a result of tax benefits is significant and tends to increase. The majority of tax benefits and exemptions are formed in accordance with the federal laws. Very few organisations can use benefits in the form of lower income and corporate property tax rates, subject to the restriction of priority areas and activity sectors and minimum investment amounts. To date, most regions have also adopted their own tax incentives for entrepreneurship, especially investments.

Adapted from Solovyeva (2019).

The law 219-FZ foresees introduction of the accelerated amortisation for the BAT equipment with an additional coefficient of 2 and possibility to deduct interest payments from income tax (Begak, 2017; Ministry of Environment and Natural Resources of Russia, 2019). In 2017 the Government issued a list of the equipment that is eligible for this incentive (Ministry of Environment and Natural Resources of Russia, 2019).

However, the tax benefit instrument is quite controversial as it could potentially violate the principle of equality of economic entities on taxation and distort competitiveness; possibly lead to rent-seeking behaviours and increase administration costs for both regulator and the economic entities (Solovyeva, 2019).

Budget subsidies and concessional finance: Subsidies can be granted on various levels by the federal or regional governments, and municipal councils (see Box 3.4). They can come in the form of cash injections (or grants), investment in capital, credits from the budget, and state or municipal guarantees. The granting of a subsidy is usually preceded by the adoption of a relevant program for economic development or similar policy document.

Federal Law 488-F3 'On industrial policy in the Russian Federation' envisions subsidies for the creation or modernisation of industrial infrastructure and production, including for the application of the BAT and lowering environmental impacts. These include subsidies to cover part of the interest payments on the loans to implement new investment projects in civic industries (Decision N3 from 3 January 2014); and subsidies to fund part of the R&D expenses (Decision N1312 from 30 December 2013) (see Box 3.5).

Box 3.4: Key principles for subsidies in Russia

The environmental protection powers are divided between the governmental levels under the joint jurisdiction of the Russian Federation and its constituent entities. The current economic compensation mechanism for the regions provides for inter-budget transfers for environmental management. The Budget Code sets forth the following types of transfers from the federal budget for environmental protection:

- "grants" means inter-budget transfers on a non-repayable basis without establishing any area and/or condition of their use.
- "subventions" means inter-budget transfers provided for the purpose of financial support for expenditure obligations arising when exercising delegated powers.
- "subsidies" means inter-budget transfers provided for the purpose of co-financing of expenditure obligations arising when exercising own powers.

Grants are provided to equalise the capacities of the regions to exercise their powers on any matter under their own or joint jurisdiction, including environmental protection. However, these expenses have an insignificant share in the sub-federal budgets, less than 1%.

Subsidies from the federal budget for environmental protection are provided to finance and co-finance capital expenditures of the constituent entities. The federal budget for 2017-2019 provides for subsidies under the state programmes "Environmental Protection for 2012-2020" and "Reproduction and Use of Natural Resources." Thus, the established procedure for subsidising environmental activities imposes serious restrictions on the possibility of obtaining state support in this area.

Adapted from Solovyeva (2019).

These incentives go through the budgets at different levels and through the special state funds for industrial development. For example, the state enterprise 'Fund for Industrial Development', created in 2014, aims at issuing special/discounted loans for the development of import-replacing and export-oriented industries and for transition to BATs. Interest rates are between 1-5% for up to 7 years for the loan of 50-500 million RUB, compared to commercial interest of upward to 9.5%. The finance could be spent for purchasing equipment, development of a new product or technology, feasibility studies or engineering services. The fund so far has financed 404 projects with the financing of 91.4 billion RUB (as at 13 May 2019, source the Fund's website at http://frprf.ru/). Two programmes of the fund are particularly relevant, including the 'development projects' programme that provides soft loans to the projects aiming at import substitution, export or production of competitive products with civil application, and the 'joint lending' programme, which lends to similar types of projects jointly from the federal and regional development funds.

On 30 April 2019 the Government further approved the rules for granting subsidies to compensate companies for the coupon income on bonds issued as part of investment projects to introduce the BATs at category 1 facilities. According to the media reports, companies will be able to receive subsidies in the form of coupon payments on green bonds issued after January 1, 2019 (TASS, 2019). Subsidies are provided under the federal project "Implementation of the best available technologies". The volume of funds for subsidies for the BAT project is planned at the level of RUB 0.3 billion in 2019; RUB 3 billion in 2020 and RUB 6 billion in 2021 (ibid).

Only projects that have been pre-screened (a process that would take place no more than twice a year) can receive subsidies. Subsidies will be provided if the implementation of an investment project contributes to the gradual achievement of technological standards for permissible emissions and discharges of highly toxic substances and substances that are carcinogenic and mutagenic.

The total value of the bond issue should not exceed 30 billion roubles and not exceed 70% of the actually incurred coupon payment. If the investment project acquires Russian industrial equipment, then 90% of the expenses on coupon income are subsidized. The company should also not be in debt for taxes and fines, it should not be at the stage of reorganization or bankruptcy. Applications for the grant will be processed by the Ministry of Industry and Trade, while the projects will be selected

with the help of an interdepartmental commission, including representatives of the Ministry of Industry and Trade, the Ministry of Environment, the Ministry of Energy, and the Ministry of Construction (TASS, 2019).

Box 3.5: Concessional lending

The Ministry of Industry and Trade adopted a resolution to support the industrial enterprises implementing new integrated investment projects[17]. It sets out the procedure for subsidies from the federal budget for compensation of part of interest expenses on loans and payment of part of coupon yield on bonds issued for implementing a new integrated investment project, subject it its inclusion in the list of integrated investment projects in priority civil industries (IIPs).

The purpose of the support is to create a new industrial enterprise or upgrade an existing one. The total cost of an investment project from RUB 150 million to RUB 10 billion, depending on when loans and bonds were obtained. A loan must be extended for more than a three-year period; and loan funds are no more than 80% of the project cost. Priority civil industries are activities that are part of the state programme "Development of the Industry and Increase in its Competitiveness" promoting:

- creation of new cost-effective production facilities and implementation of BAT in production;
- development of industrial production to increase the output of high-tech products;
- increase labour productivity through the use of advanced technologies and up-to-date equipment and the creation of high-performance jobs;
- creation of conditions for the promotion of innovative Russian products and technologies in the global markets;
- energy efficiency and resource saving;
- In accordance with OKVED (the All-Russian Classifier of Economic Activities), a project shall relate to the processing industry or organisation of waste collection and disposal or clean-up of pollution.

Subsidy amount:

- If an interest rate is higher than the base rate of the Central Bank, 70% of the base rate will be compensated.

[17] Resolution No. 3 dated 3 January 2014 of the Government of the Russian Federation "On Approval of the Rules for Granting Subsidies from the Federal Budget to Russian Organisations to Reimburse Part of Interest Expenses on Loans Obtained in 2014-2019 in Russian Credit Organisations and State Corporation "Bank for Development and Foreign Economic Affairs (Vnesheconombank)" and in International Financial Organisations Established in Accordance with International Treaties to which the Russian Federation is a Party, for the Implementation of Integrated Investment Projects in Priority Civil Industries and/or Payment of Coupon Yield on Bonds Issued in 2014-2019 as Part of the Implementation of Integrated Investment Projects in Priority Civil Industries"

- If an interest rate is lower than the base rate of the Central Bank, 70% of the rate will be compensated.
- Subsidies on loans obtained in 2014-2016 are provided to the extent of 70 percent of the organisation's interest expenses on the loan.
- A subsidy is payable twice a year (Q2 and Q4).[18]

A decision on whether to include project in the list is taken by an interdepartmental commission at least once a calendar year. When selecting projects, the commission assesses investment projects in accordance with the criteria of financial, budget, social and economic efficiency. Amount of budget funds for support measures, in millions of roubles:

- 2018 – RUB 6,858 million
- 2019 – RUB 8,600 million (the budget is not confirmed)
- 2020 – RUB 8,593 million (the budget is not confirmed)

Adapted from Solovyeva (2019).

Regional Level of BAT Incentives

There is a potential for state support of economic activities carried out in order to protect the environment at the expense of the budgets of the constituent entities. Federal Law No. 184-FZ dated 6 October 1999 "On General Principles of Organisation of Legislative (Representative) and Executive State Authorities of the Constituent Entities of the Russian Federation" (184-FZ) refers under the jurisdiction of the constituent entities:

- organisation and implementation of regional and inter-municipal programmes and projects on environmental protection, environmental safety and solid waste management;
- determination of the waste generation standards and waste disposal limits, the procedure for collecting solid municipal waste (including their separate collection), solid municipal waste accumulation standards, solid municipal waste management tariffs, approval of the territorial waste management scheme, including solid municipal waste;
- organisation of collection (including separate collection), transportation, processing, disposal, neutralisation and dumping of solid municipal waste;
- creation and maintenance of protection of specially protected natural areas of regional value; maintenance of the Red Book of the constituent entity of the Russian Federation;

[18] Resolution No. 702 dated 20 July 2016 of the Government of the Russian Federation "On Application of Basic Indicators When Calculating Parameters of Subsidising the Interest Rate from the Funds of the Federal Budget on Loans, Bond Loans and/or Leasing Agreements Depending on Lending Terms, and Determination of the Limit Level of the Final Lending Rate Above Which the Interest Rate is Not Subsidised".

- regional state supervision in the field of protection and use of specially protected natural areas.

The Federal Law "On General Principles of Local Government Organisation in the Russian Federation"[19] (131-FZ) assigns to local authorities:

- all types of municipalities − participation in the organisation of collection (including separate collection) and transportation of solid municipal waste, municipal districts and urban districts are also assigned the powers of processing, disposal, neutralisation and dumping of solid municipal waste;
- all types of municipalities − implementation of municipal forest control;
- urban districts and urban settlements − issues of use, protection, conservation, reproduction of municipal forests, forests of specially protected natural areas located within the boundaries of municipalities;
- urban districts and municipal districts − powers of the owner of water bodies[20], and establishment of the rules for the use of public water bodies for personal and domestic needs, including the provision of free access of individuals to public water bodies and water shorelines.

The site of the State Information System Industry[21], maintained by the Ministry of Industry and Trade, contains a database of state support mechanisms at the federal and regional level. A search of this database identified eight support measures under the term 'BAT' and eleven support measures for the term 'environment'(as at 25 June 2019), some of which might also be supportive to the objectives of the BAT transition, covering various types of support at federal or regional levels. Examples of these measures, in addition to those discussed above, include:

- Programme of targeted loans for the federal programme 'Development Projects' to support investments for application and development of new technologies or import substitution; size of loan 50-500 million roubles, up to 5 years; at least 50% co-financing is required.
- Several programmes that offer joint loans between federal and regional funds for industrial development, e.g. in Tatarstan, Vologodskay oblast, Archangelsk oblast and others. Similar programmes are offered at the regional level in Lipetsk oblast;
- Compensation of coupon payments on bonds issued for the implementation of the BAT projects (as discussed earlier);

[19] Federal Law No. 131-FZ dated 6 October 2003 "On General Principles of Local Government Organisation in the Russian Federation"

[20] Within the limits established by the water legislation of the Russian Federation, including implementation of measures for the prevention of negative impact of waters and elimination of its consequences, implementation of measures for the protection of such water bodies, establishment of water body use fee rates, the procedure for calculation and collection of such fee;

[21] htttps://gisp.gov.ru/support-measures/

- Subsidies for legal entities to cover part of the costs for education, training and professional development of staff, including on topics such as improving environmental safety, energy efficiency, etc.;
- Subsidies for legal entities to cover part of the cost of interest on bank loans related to projects that are included in the list of innovative projects, including among other projects that increase energy and resource efficiency, creation of waste-free and environmentally friendly production;
- Subsidies for export for agricultural machinery producers, including for the use of environmentally friendly transportation;
- Subsidies for part of the costs of interest on the loans related to the implementation of the federal targeted programme "Development of water industry in Russia in 2012-2020' (e.g. a regional programme in Komi republic);
- Loans for implementation of projects aimed at industrial development, targeting mainly product and technology developers;
- Grant programme 'Development', which supports companies that have experience of developing and applying new types of products. Total grant is up to 20 million Roubles and requires at least 30% co-financing;
- Guarantees for start-ups;
- Support for engineering and environmental and technical audit services, as well as support for standardisation and certification of products.

Table 3.1: Summary of instruments: current status and possible developments

Environmental pollution charges	Fines	Subsidies	Tax exemptions	Concessional Lending	Refinancing instruments
Created early 1990s. Low basic rates for pollution charges do not encourage behavioural change. May be a potential area of indirect state support for the implementation of BATs.	Penalties for violations of the Russian laws on subsoil resources. Significant threat to company's economic affairs. Increases in penalties are unlikely to work in terms of providing incentives for more-timely implementation of BAT. However, ensuring compliance with current increased fines will provide some incentive not to delay BAT in some sectors.	The Budget Code allows Regions to give subventions to stimulate investments. Governmental subsidies can be granted on various levels of the state. Some regions have special laws on stimulating investment. Federal Law 488-F3 envisions subsidies for the application of BAT. Resolution No. 3 dated 3 January 2014 allows the provision of subsidies for payment of interest on loans and/or payment of coupon yield on bonds for the implementation of an integrated investment project. Subsidies are provided subject to the inclusion of an investment project in the **list of integrated investment projects** in priority civil industries (IIPs) of the Ministry of industry and Trade. There should be scope for more targeted use of these subsidies and a possible expansion of the size of the funds.	The budget and taxation laws allow tax benefits. Federal level tax benefits exist (Tax Code), including credit for investment (art. 66 and 67) which allows deferring tax payments over a certain time. Law foresees introduction accelerated amortisation for BAT equipment. A list of eligible equipment exists. Special economic zones enjoy a range of tax exemptions, including accelerated depreciation. Regions can reduce the tax rates on the part of a tax that goes to the regional budget (currently, there are benefits for income tax, VAT or property tax). Although the review shows that tax exemptions are complex, there are not estimates of how effective these instruments are. Some investment tax credit schemes have been in operation in Russia for a few years, however there is little information on the uptake and their effectiveness. More research is needed to find out.	The state enterprise 'Fund for Industrial Development' aims at issuing special/discounted loans for the transition to BATs. A number of other mechanisms have been created at the federal and regional levels, yet most are targeted towards SMEs and technology producers. An expansion of this program may be a potential area of economic incentives. Further several concessional loan programmes are suitable to support BAT.	During the last financial crisis, the Central Bank could lend money at half the market interest rate (i.e. 7-8% instead of 17.5%) for projects of special social importance. The impact of such schemes could be a significant boost for the commercial banking sector to offer loans for BAT implementation, especially if the duration can be extended as well.

3.3 Barriers and Opportunities to economic instruments for BAT in Russia

This section identifies key challenges and opportunities for the implementation of economic instruments for BAT in Russia based on the input from the stakeholder workshops, expert interviews and written submissions from participants in Russia representing academia, public sector and industry.

'Stick' instruments: Charges and fines

While the system of charges and fines should, in principle, stimulate transition to the BAT there are a number of barriers in Russia, which were noted during the expert consultations. Some barriers relate to the perceptions, in particular among the private sector, of the lack of fairness in the fundamental principles on which the system of charges is built. They also include practical considerations around the levels of the fines being too low to stimulate investment by the private sector, low capacity of the regulator to enforce the standards and collect the fines.

The lack of earmarking of the income from the environmental charges and fines for environmental protection expenditures by the state or for the support to BAT is perceived as an important shortcoming by many key actors. There is therefore a strong perception that the system of environmental charges and fines is not meant for incentivising action, but rather for filling the budget. This is a particularly important concern in Russia potentially due to the past experience where the earlier system was based on earmarking the part of revenues for environmental protection through the federal and regional environmental funds.

A point was raised by the business representatives at the workshop implying that the system of charges for resource use is unfair in that the enterprises investing in the BAT would still have to pay the user charges. Yet, our understanding is that the current legislation envisions that category 1 enterprises complying with the BAT would not be paying environmental charges and fines from 2020. Hence there may be a need for additional discussion and clarification of the provisions between the representatives of the government and the industry.

The low basic rates for calculating pollution charges in Russia have not encouraged companies to radically change their environmental impact, as discussed earlier.

Yet, despite these challenges, there are projects in some sectors that become economically viable once charges and fines are taken into account. Experts who participated in the first project workshop noted that such projects can be seen, for example, in the energy sector. This is particularly true given the higher levels of fines that are to be applied under the new legislation for the enterprises that do not comply with the BAT and exceed permitted limits of pollution. Furthermore, 'stick' type instruments, like charges, historically have worked well in Russia and therefore are better understood and more straightforward to implement.

'Carrot' instruments: Subsidies, soft loans and tax benefits

Instruments of direct support to BAT currently foreseen in the Russia's legislation, e.g. in the form of soft loans, subsidies and tax incentives, as discussed above, would have potential to provide access to cheaper and potentially longer term finance essential for funding industrial transitions. Yet, participants at the workshop were generally

sceptical about the prospects of these instruments in the near future due to several barriers.

The main overall concern was related to the perceived dysfunctionality of the administration system for financial incentives. Experts noted that high bureaucracy and heavy reporting burden and litigation risks (the threat of administrative and criminal charges for failure to report the spending to satisfactory standard) raise costs for the private sector to the level where they outweigh the benefits of the economic incentives.

Specific barriers that need to be overcome in relation to soft loans are: the levels of interest rates are too high at 11-15% pa and the lending periods too short (e.g. the Fund for Industrial Development with loans of up to 7 years is an exception, with most commercial banks lending for much shorter periods). Many enterprises, especially smaller ones, also lack finance for collateral deposit. Generally, the size of the Fund was deemed as too limited for the scale of investment required for BATs.

Furthermore, the current system of financial incentives (including soft loans and subsidies) is mainly geared to support technology producers (in particular import substituting technologies) rather than polluting enterprises that need to modernise and invest into adoption of the BATs. This is connected with an overall concern with the international political context and the impact of economic sanctions on technology imports from the EU (which are central to BAT) and the priority placed on import substitution policies.

The brief analysis of the schemes contained in the State Information System Industry mentioned above, shows that a few schemes that do support investments into modernisation are geared towards small and medium enterprises (SMEs) and offer rather small soft loans and subsidies, which would not be sufficient for the level of investment required at the industrial complexes. Furthermore, most of the soft loan schemes require significant co-financing either from the applicant's own resources or from a third party.

Institutionally there are also challenges around additional expertise required for administration of financial incentives both in the public sector at the control and monitoring agencies, and in the private sector at the investing companies and at the financial institutions participating in the incentive schemes (e.g. the banks administering soft loans). Some of the particularly important issues identified include: who and how gets to propose new technologies and techniques for the BAT lists (how are BREFs updated); how to simplify procedures for financial institutions lacking BAT expertise; how to simplify the administrative burden while keeping the system transparent, credible and robust?

Opportunities

Overall, many of the issues raised reflected that Russia is still largely at the design and very early stages of the implementation process for the BAT transition. While the key

economic instruments have been outlined in the legislation and regulatory documents, their operational details still need to be largely worked out and refined along the way. The institutional mechanisms for implementation need to be enhanced, including for example strengthening cooperation with the Ministry of Finance and Tax office, and addressing the gaps in the legal and regulatory basis for economic instruments.

There is also a need to strengthen capacity of the key actors and to address the lack of successful experience at scale in Russia with economic instruments of stimulating investment. In particular, the small and medium enterprises are mostly not prepared to access economic instruments, creating an important entry barrier for them.

In this context learning from positive and negative experiences with design and implementation of economic instruments to support BAT in Europe and other relevant countries offers an opportunity to help some of the above barriers. Experts in particularly noted that it would be valuable to have Information about macro-impacts of BAT transitions (e.g. whether adoption of BAT lead to improvements in the environmental safety of production; macro-economic impacts such as decoupling of emissions from GDP, impact of the BAT on the net cost/tariffs, opportunities for achieving social and environmental multiplier effects) and indicators that could be used to assess it at macro and enterprise level. In relation to the economic instruments analysis of pros and cons in terms of the effectiveness of various instruments in practice, their limitations and areas (sectors) of priority application, as well as experience with special financial instruments, such as green bonds, and experiences with "state owned banks" in the implementation of instruments were considered as particularly useful.

Furthermore, training and development of education system on environmental, technical, legal and financial aspects of BAT implementation for the experts participating in the BAT processes in Russia and public awareness building would be important going forward. Development of 'manuals' with algorithms for actions and short examples, as well having simple navigators on various forms of support for BAT and express trainings (business games) on the development of applications for support would help limit administrative burden.

Going forward experts who provided feedback at the workshop saw particular potential for supporting BAT in attracting and allocating resources from the federal and regional budgets, application of tax credits from the profit tax that allow to deduct part of investment for energy efficiency and reducing environmental impact, while adopting BAT; in significant increase in the level of charges if refusing to adopt BAT; green bonds.

It was also noted that given that the level of preparedness of the enterprises differs, it is important to differentiate the instruments based on the readiness of users for their application and to apply a staged approach-from simpler to more complex instruments.

4. Economic push-instruments for research and development as well as implementation of BATs in EU member states

Significant environmental degradation connected with economic development has occurred in the past and is expected to continue if no action is taken. This has led to increase attention to efficient use of energy and resources and to a lot of countries taking policy measures to promote green technologies and technologies for energy and resource efficiency, as well as best available techniques, in all economic sectors.

Different **types of measures** are in place: economic instruments, behavioural measures, education and information, regulatory instruments, research and development, and voluntary approaches. This chapter focuses on economic instruments for implementing BATs for energy and resource efficiency in industry in the EU context, which are being used as a reference model for promoting BAT in Russia. Although most instruments analysed are not BAT specific and tend to focus on energy efficiency, they relate somehow to BAT adoption as minimum requirements always exist regarding the level of saving of energy in technologies to be promoted.

4.1. Economic push instruments in relevant Member States

Member States apply different **economic instruments** to create the market conditions necessary to encourage investment by the private sector in energy and resource efficient technologies, and to push the development and/or market uptake of clean technologies. Tax relief programs, low interest loans and grants seem to be the preferred instruments of governments for this purpose. These instruments help overcome barriers to energy and resource efficiency by lowering the capital cost of investments, thus giving an incentive to firms to invest in innovation or to purchase energy-efficient technologies.

This section examines the evidence from four tax relief programs, three loans and/or leases (sometimes combined with grants) programs and one grants program (see Table 4.1): one loan and one gran program in Germany, two tax relief programs in the Netherlands, once tax relief program in the Basque Country in Spain, one loans and leases program (combined with grants) in Poland, one loans and leases program in Turkey, and one tax relief program in the United Kingdom. The functioning of the programs has been explained and its performance evaluated, to the extent possible because data are often limited, based on two criteria: **environmental effectiveness** (e.g. energy and resources saved; projects or technologies financed) and **economic efficiency** (e.g. costs of the program and multiplier effects).

Table 4.1: Analysed programs by country and type

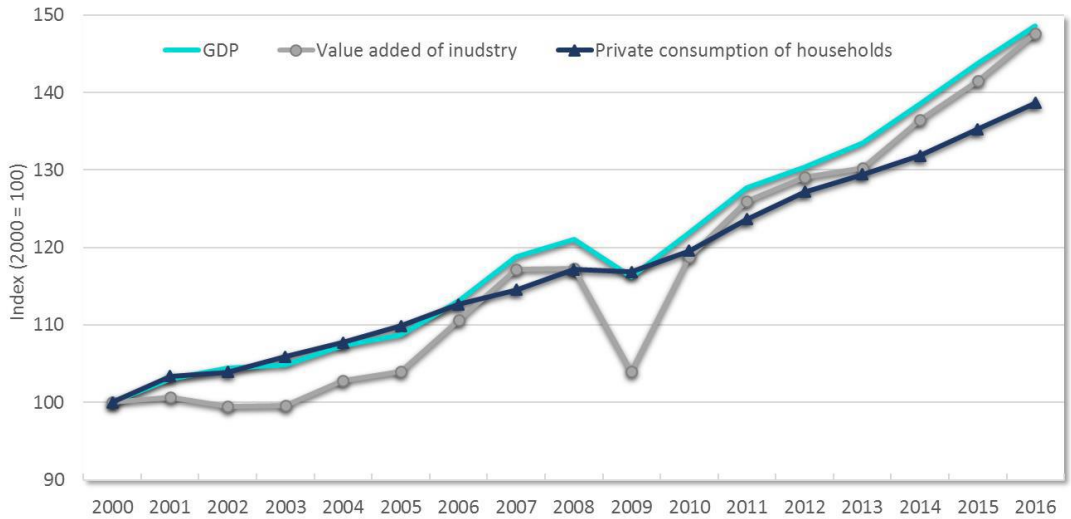
	Tax relief	Loans and/or lease	Grants
Germany		√	√
Netherlands	√ (x2)		
Basque Country (Spain)	√		
Poland		√	
Turkey		√	
United Kingdom	√		
Total	4	3	1

The case studies suggest that these kinds of program appear to be quite effective in encouraging investments by industry and market uptake of energy and resource efficient technologies at a reasonable cost. The lessons learnt from the implementation are then used to provide specific recommendations for BAT in the Russian Federation.

State economic incentives in Germany

Germany's GDP has significantly grown between 2000 and 2016. The financial and economic crisis affected the economic growth between 2008 and 2009, and specially the industrial sector whose value added dropped 11% in that period, but continued to growth since.

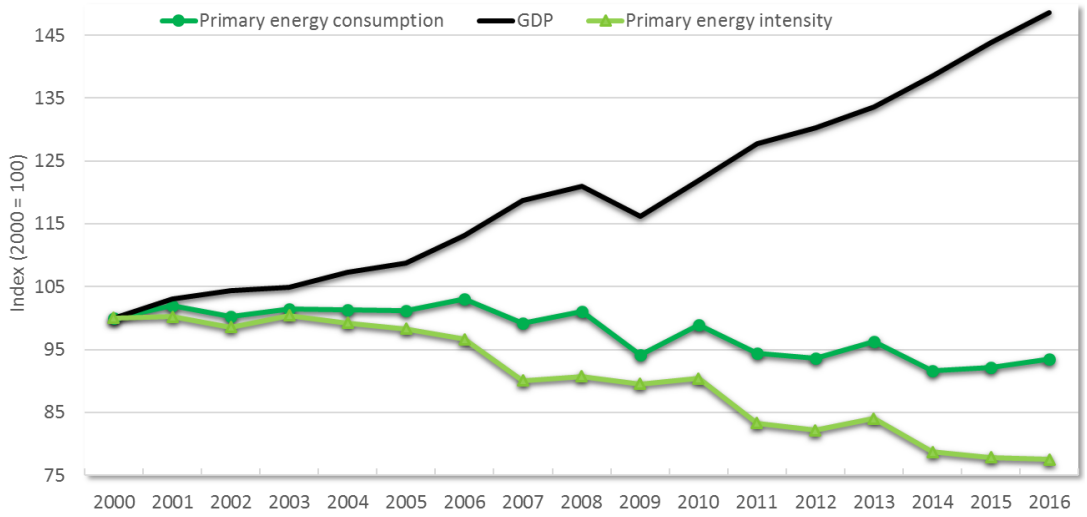
Figure 4.1: Economic growth in Germany, 2000-2016



Source: ODYSEE database (in Eliana López et al., 2018)

As Figure 4.2 shows, the economic growth has been decoupled from primary energy consumption. While GDP increased around 50% between 2000 and 2016, the total energy consumption (or primary energy) declined 6%.

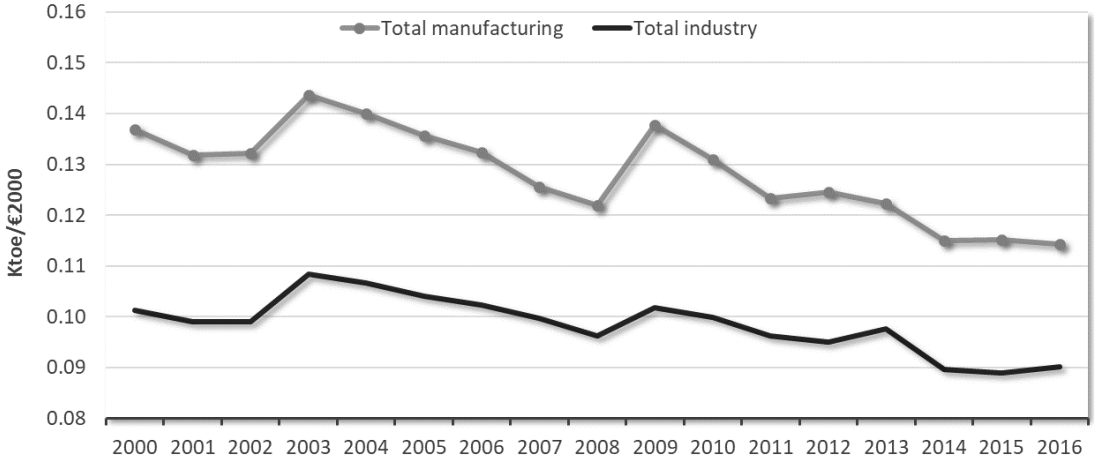
Figure 4.2: Decoupling of energy consumption and GDP, 2000 - 2016



Source: ODYSEE database (in Eliana López et al., 2018)

Industrial sectors comprised in 2015 just under 10% the total GVA across all economic activities in Germany (European Commission, 2018b) and accounted for 29% of the final energy consumption (Eliana López et al., 2018). Energy efficiency in industry, described by the aggregate indicator of energy consumption compared to value added (i.e. energy intensity), shows a decoupling of these two variables (see Figure 4.3).

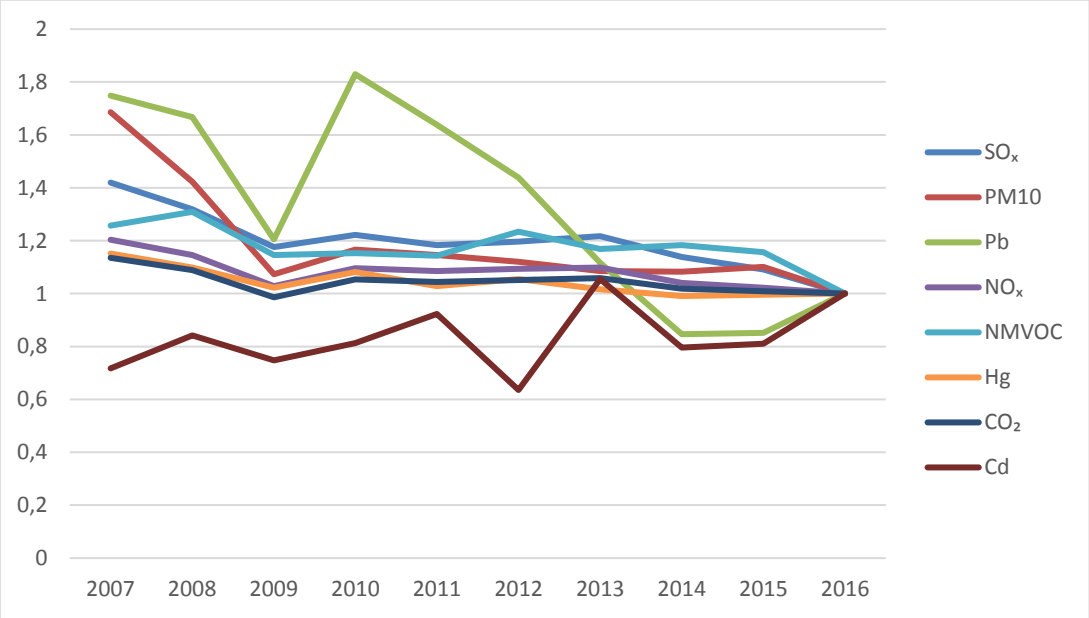
Figure 4.3: Energy intensity in industry and manufacturing, 2000-2016



Source: ODYSEE database (in Eliana López et al., 2018)

Industry sector emission to air trends are shown in Figure 4.4. Emissions are indexed to 2016. For all air pollutants reported but Cadmium (Cd), a decreasing trend can be observed. This includes SO_x (Oxides of Sulphur), PM10 (Particulate Matter), Pb (Lead), NO_x (Oxides of Nitrogen), NMVOC (Non-Methane Volatile Organic Compound), Hg (Mercury) and CO_2 (Carbon Dioxide). The economic crisis in Europe in 2009, which is also reflected in the GVA development in the industrial sector, is also likely to have played a role in the abrupt declined that took place until 2009.

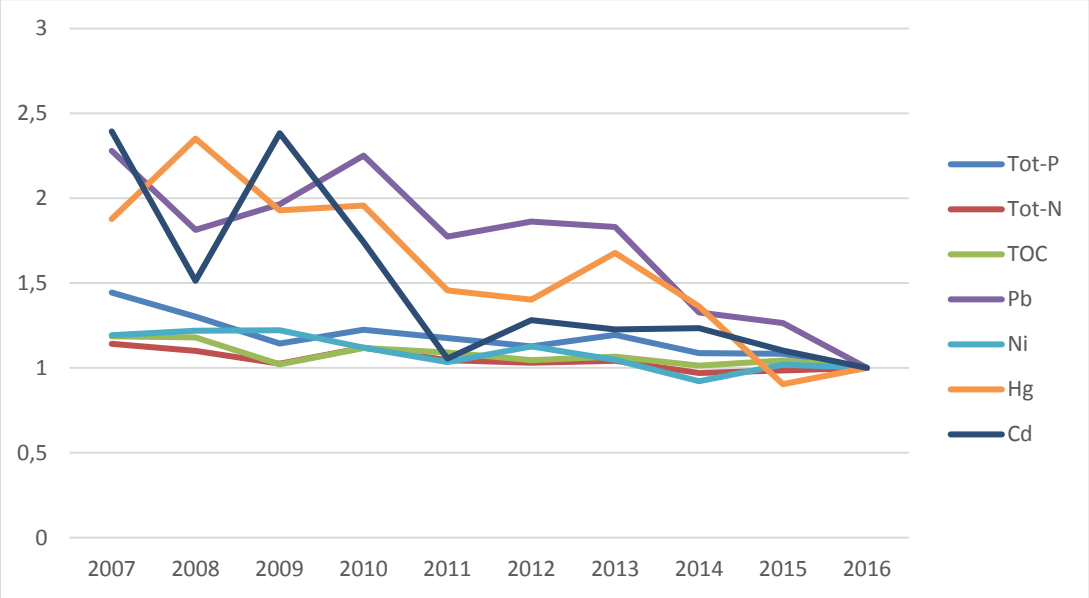
Figure 4.4: Industrial air pollution in Germany, 2007-2016 (indexed 2016=1)



Source: based on EEA data

Industrial water pollution from 2007 to 2016 is shown in Figure 4.5 indexed to 2016. A decreasing trend can be observed for all water pollution emissions: P (Phosphorus), N (Nitrogen), TOC (Total Organic Carbon), Pb (Lead), Ni (Nickel), Hg (Mercury) and Cd (Cadmium). This decrease is likely to be due to legislative requirements under the existing IPPC Directive and more recently the IED, although the economic crisis is also likely to have impacted (European Commission 2018b).

Figure 4.5: Industrial water pollution in Germany, 2007-2016 (indexed 2016=1)



Source: based on EEA data

Successful policy instruments in Germany targeting industry's energy and resource consumption and CO2 emissions include the KfW Energy Efficiency and Environmental Programs and the Federal Ministry for Economic Affairs and Energy (BMWi) "Promotion of energy-efficient cross-cutting technologies in SMEs". These instruments are described below.

KfW Environmental and Energy Efficiency Programs

Context

The KfW Energy Efficiency and Environmental Programs replace the former ERP (European Recovery Programme). Compared with the previous ERP, the new KfW programs also include and encourages measures for resource efficiency and material savings. Renewable energy and CHP projects are excluded as they are financed via other programmes

Description

The KfW Environmental and Energy Efficiency Programs provide **soft loans** for financing energy efficiency measures and investments in and outside Germany with a **positive impact on the environment**. Energy efficiency measures financed include, building envelopes; machinery; process cooling and heating; heat recovery/waste heat utilization; measurement, regulation and control technology; information and communication technology; procurement of low-emission commercial vehicles, including the associated costs for planning and implementation support for SMEs.

Measures with a positive impact on the environment include: reduction or prevention of air pollution; improvement in sewage treatment and drinking water supplies; prevention and treatment of solid waste; efficient generation and use of energy; use of renewable sources of energy; manufacture of especially innovative, environmentally-friendly products; investments in environmental service companies.

In the case of energy efficiency, minimum requirements exist regarding the level of saving of measures. For new investments, 15% less than the average for the industry is required. For replacement investments, 30% less than the mean consumption for the last three years must be proved. The anticipated energy savings must be estimated before the application is filed. The maximum amount loaned is 25€ million. The financing share can be up to 100 % for small companies and lenders can receive up to three repayment-free start-up years.

The KfW Environmental Protection Program is also available for the financing of environmental protection investments outside Germany. It offers favourable interest rates (from 1.03%, depending on the particular economic conditions and the quality of the collateral of the borrower) loans of up to 10€ million per project to private companies and self-employed persons, with a loan term of up to 20 years, up to three years repayment-free and up to 100% disbursement. The type and amount of collateral is to be arranged with the financing partner of the SME applying for credit.

Typical Bank Lending Rate in Germany averaged 3.77 percent from 2003 until 2019, reaching a record low of 2.01 percent in January of 2019.[22]

Budget

Total amount of **loans disbursed** under the **environmental protection programme** and the **energy efficiency programme** has been increasing over the years. From 1.3 billion EUR in 2009 to 1.5€ billion in 2010 and 3.2€ billion in 2011.

Beneficiaries

Self-employed professionals, and German and non-German enterprises of all sizes and in all economic sectors.

Actors involved

The Energy Efficiency and Environmental programs are loan programs from the German Development Bank KfW. **Local financing partners** (commercial banks, savings banks, cooperative banks, direct banks, building societies, insurance companies and financial intermediaries) are central to this instrument. Loan application is done via local financing partners, which are also responsible for setting interest rates according to a risk assessment. After reviewing the application for credits and setting interest rates, financial partners will pass the application documents to

[22] https://tradingeconomics.com/germany/bank-lending-rate

KfW. The application documents will then be examined by KfW which will take the final decision on funding.

Impact

Assessment of the energy savings by the Energy efficiency and Environmental Programme has been included in the third NEEAP. The impact has also been assessed by Öko-Institut, Fraunhofer ISI (2017). However, available data makes it difficult to know if savings are good or not and what is the programme's economic effectiveness. Estimated yearly savings in primary and final energy and in CO2 emissions are summarized in the table below.

Table 4.2: Primary and final energy savings

	Cumulative savings		Yearly savings						
	2009-13	2014-20	2014	2015	2016	2017	2018	2019	2020
Impact assessment in the Third NEEAP									
Primary energy saving (PJ)	96	164	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Final energy savings (PJ)	61	104	3.7	7.4	11	15	19	22	26
Impact assessment in Öko-Institut, Fraunhofer ISI, 2017									
Final energy savings (PJ)				0	2.3	6.3	10.3	14.3	18.3
Savings in CO2e (Mt)				0	0.4	1.0	1.6	2.2	2.8

Source: 3rd NEEAP 2014 for the Federal Republic of Germany and MURE database

BMWi support for the use of highly efficient cross-cutting technologies in SMEs

Context

The Federal Ministry for Economic Affairs and Energy (BMWi) Investment Grants for the Use of Highly Efficient Cross-Cutting Technologies funding program was launched in 2012 to help companies implement highly efficient cross-cutting

technologies. A revised version of the program entered into force on May 2016, putting stronger focus on the industrial sector.

This measure is part of the Energy Efficiency Fund of the German Government, which contains 23 policy measures including funding schemes and educational activities targeting at contributing to a highly energy-efficient economy, the achievement of climate protection targets and existing energy saving potentials, and the decrease of energy costs.

Description

The programme for funding highly efficient cross-cutting technologies provides **grants to SMEs and to bigger companies** to encourage investments (new or replacements) in highly efficient cross-sectoral technologies available on the market such as engines, compressors or pumps. Companies must have a permanent establishment or branch in Germany. There are two options available:

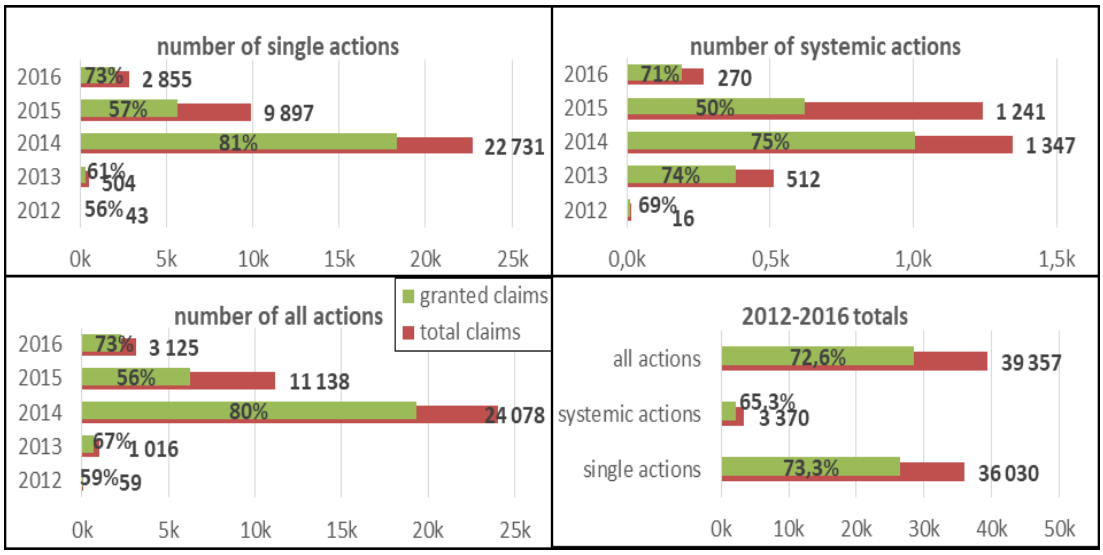
1) The exchange of a **single technology**. Eligible technologies include electric motors and drives, pumps, HVAC systems, compressed air systems, heat recovery systems and waste heat recovery (only for air conditioning systems and compressed air systems). Efficiency requirements are specified for each technology. The replacement and new acquisition of individual plants or aggregates from a net investment volume of 2,000€ with a subsidy of up to 30,000€ per project (i.e., the sum of all individual measures) are subsidized at one location.

2) A **systemic approach**: Precondition is the establishment of an energy saving concept that leads to at least 25% of proven energy savings. Eligible measures include the exchange or new installation of at least two technologies as well as the replacement and renewal of equipment or components that contribute to improving the energy efficiency of the cross-cutting technologies. In addition to the technologies under option 1, the following technologies and services are eligible: renovation of lighting systems, necessary services for the insulation of pipes, pumps and valves, advisory services required to establish an energy-saving concept and the acquisition of measurement technologies for determining the energy consumption. When optimizing technical systems, the minimum net investment volume is 20,000€ and the maximum funding amount is 100,000€. If the application includes measures to optimize industrial or commercial pump systems, a grant of up to 150,000€ will be granted.

Budget

The annual budget (i.e. amount of money assigned to the grant measure "support of cross-cutting technologies") has increased over the years, from 10€ million in 2012 to 120€ million in 2017. The number of claims increased from 2012 to 2014 and has decreased since (see figure). The total number of claims between 2012 and 2016 was 39,357, of which 72.6% were granted.

Figure 4.6: Total claims and granted claims



Source: Voswinkel, F., et al., 2018

Total claims display the number of all claims (granted, rejected and in process) for the two project types, single actions and systemic actions (complex actions consisting of several technologies working together with higher maximum funding), and totals. Granted claims include all granted claims.

Beneficiaries

Financial incentives for cross-sectional technologies in a wide range of industries, especially for small and medium-sized enterprises.

Actors involved

The programme for funding highly efficient cross-cutting technologies is currently being funded under the Energy Efficiency National Fund. The Implementation and execution of the support program is by the Federal Office of Economics and Export Control (BAFA).

An energy consultant needs to prepare an energy saving concept in the beginning of the course by means of a detailed energy consultation, in which the use of highly efficient cross-sectional technologies for the optimization of the examined system was tested and evaluated.

Impact

Assessment of the energy savings by the Investment Grants for the Use of Highly Efficient Cross-Cutting Technologies funding program has been included in the third NEEAP. The impact has also been assessed by Öko-Institut, Fraunhofer ISI (2017). Yearly savings in primary and final energy and in CO2 emissions are summarized in the table below.

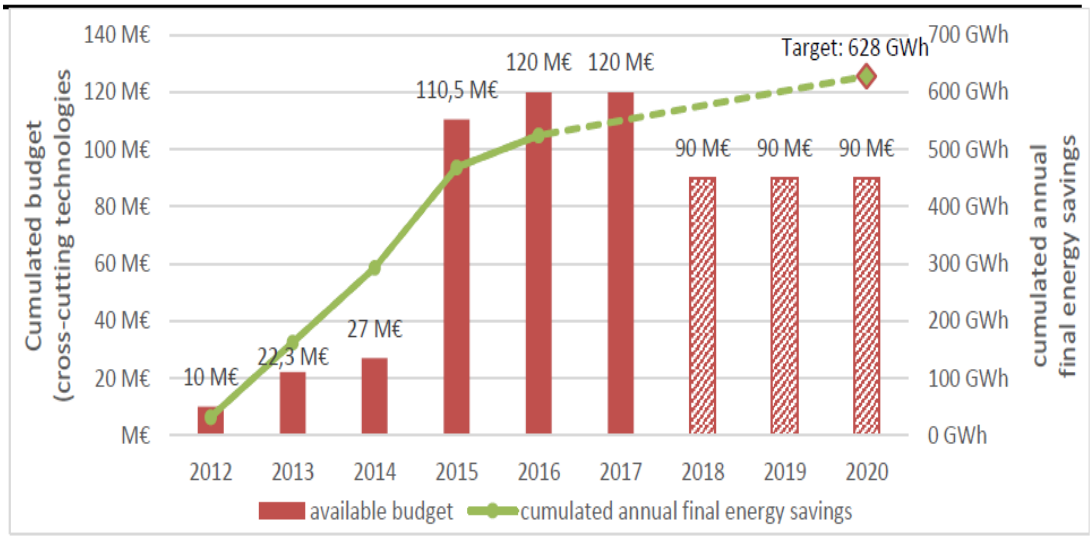
Table 4.3: Cumulative and yearly savings of Investment Grants

	Cumulative savings		Yearly savings						
	2009-13	2014-20	2014	2015	2016	2017	2018	2019	2020
Impact assessment in Third NEEAP									
Primary energy saving (PJ)	6	23	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Final energy savings (PJ)	5	19	0.7	2	4.1	6.8	10	14	19
Impact assessment in Öko-Institut, Fraunhofer ISI, 2017									
Final energy savings (PJ)			n/a	n/a	n/a	n/a	n/a	n/a	n/a
Savings in CO2e (Mt)			n/a	0.8	1.5	2.3	3.1	3.9	4.6

Source: MURE database

A recent evaluation report (Voswinkel, F., et al., 2018) shows the cumulated annual final energy savings of the scheme. Results available until 2016 show cumulated final energy savings over 500 GWh. Energy savings in 2020 are estimated at 2,260 TJ (628 GWh) per year from actions implemented 2012-2020 (cumulated annual final energy savings). This is equivalent to 0.9 Mt/year CO2-eq. emissions reduction, which equals 0.46% of German 2020 reduction goal.

Figure 4.7: Budget (in M€) and cumulated annual final energy savings (in GWh/y)



Source: Voswinkel, F., et al., 2018

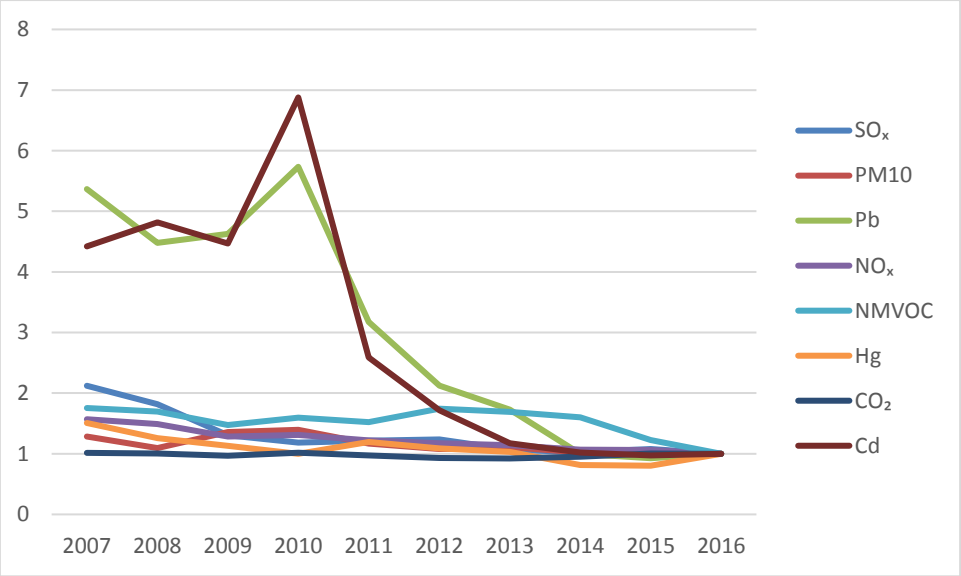
Average energy savings per 1000€ spent (funding + administrative) are estimated to be 26.74 MWh over the lifetime of the actions (i.e. 37.9 € per saved MWh). Total administrative cost (i.e. not including funding or grant cost) relative to the number of granted actions is 99,21€ per granted action, while energy savings are estimated at 0.52€ per saved MWh and CO2-savings at 1.04 € per saved t CO2-equivalent. Total investment triggered by funding (i.e. Euros of total investment per Euro spent for funding) is estimated at 4.05€ (Voswinkel, F., et al., 2018). This makes the program highly efficient.

State economic incentives in the Netherlands

Industrial sectors contributed in 2015 a 7% of the total national GVA and accounted for around 27% of the total energy consumption in the Netherlands (European Commission, 2018c). The largest industrial consumers are the chemistry (40%), steel (21%) and food industry (18%). Energy consumption in industry has decreased in all sectors since 2000 but in the steel industry, in which it has increased.

Industrial sectors were responsible for around half of the NOx, PM2.5, NMVOC, NH3, Cr and Cu emissions of pollutants emitted to air in 2015 (European Commission, 2018c). Air emissions data is shown in Figure 4.8 for the time period 2007 to 2016. Emissions to air show decreasing trends for all contaminants.

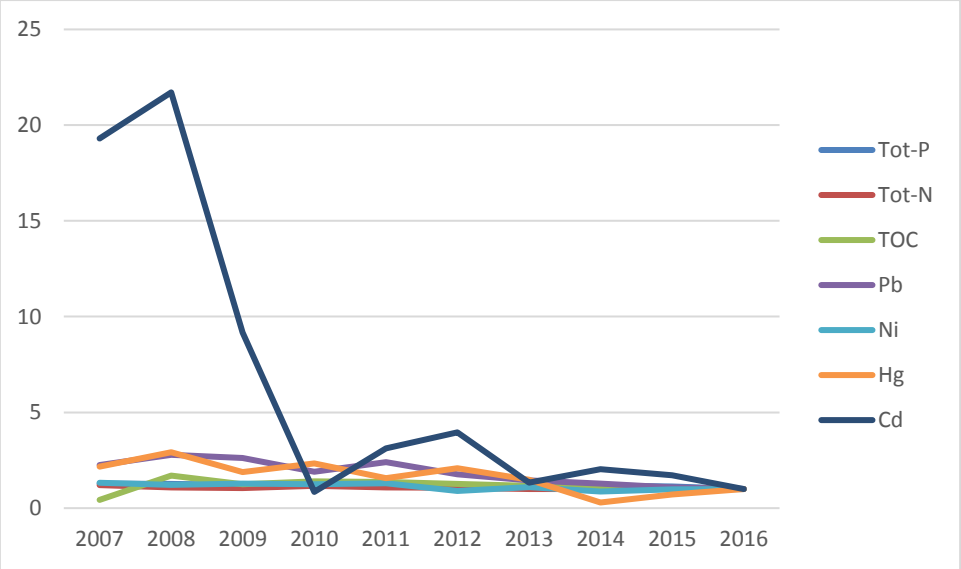
Figure 4.8: Industrial air emissions in the Netherlands, 2007-2016 (indexed 2016=1)



Source: based on EEA data

The industrial sectors contribute to the major share of emissions to water in the Netherlands. They are the sole, or almost the sole, emitter of cyanides, diuron, PCBs, As, Cd, Cr and Hg (European Commission, 2018c). Figure 4.9 shows industrial water emissions trends in the time period 2005 to 2015. A decreasing trend can be observed for all pollutants with the exception of TOC.

Figure 4.9: Industrial water emissions in the Netherlands, 2007-2016 (indexed 2016=1)



Source: based on EEA data

Measures aim at reducing air and water emissions in the industry sector are described below. The Environmental Investment Allowance (MIA) and the random deductions for environmental investments (VAMIL) schemes makes investing in energy and resource efficiency measures more attractive by allowing tax deductions and accelerated depreciation of investments. The Energy Investment Allowance (EIA) offers the possibility for the purchase of designated innovative energy-efficient equipment for an additional allowance on taxable profit.

The Environmental Investment Allowance (MIA) and the random deductions for environmental investments (VAMIL) schemes

Context

The Dutch government has been committed to a clean environment for many years now. Moreover, the Netherlands is good at producing innovative ideas and solutions but less effective at getting these into the market.[23] Ensuring investment in environmentally friendly technologies, is perceived by Government as an important way to **realise the goal of a clean environment** and to **promote green technologies**.

Description

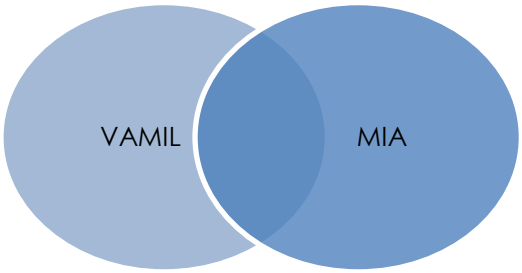
The MIA and VAMIL schemes are intended to stimulate the investment in environmentally friendly technologies by **businesses and entrepreneurs paying income or corporate tax in the Netherlands**.

[23] CASE 6: VAMIL AND MIA, THE NETHERLANDS (unknown author)

The Environmental Investment Allowance (MIA) provides the opportunity for private companies to deduct an extra amount of the investment cost from the taxable profit for all investments that are included in the **Environmental List**, regardless of how much environmental improvement it delivers. The exact share of the investment that applies for the **deduction** varies between 15% and 36% of investment costs depending on the nature of the investment. Each business can be granted the MIA for environment-related investments of a minimum of 2,500€ (i.e. minimum investment is 2,500€). A cap is set on 25€ million per taxable person per year.

Random depreciation of environmental investments scheme (VAMIL) provides the opportunity to depreciate 75% an investment that is included in the **Environmental List** in a single year, thereby reducing the taxable profit in that year. The depreciation of remaining 25% of the investment should be spread over the economic lifetime of the obtained goods. A cap is set on 25€ million per equipment. **Accelerated depreciation** is a type of tax relief. It allows purchasers to write-off the cost of depreciation of qualifying equipment more rapidly than standard equipment, thus effectively reducing the total cost of the equipment

For certain technologies on the Environmental Technologies List, it is possible to use a combination of both VAMIL and MIA, so for example a 27% tax deduction under MIA together with a 75% depreciation under VAMIL may apply.



Box 4.1: The (MIA and VAMIL) Environmental List

The Environmental List is drawn up and revised annually by the Ministry of Infrastructure and Environment. It provides an overview of the investments eligible for MIA and/or VAMIL tax credits.

Companies can submit proposals to include a product or company resource on the Environmental list. In order to be considered for the list, the environmental investment must have a clear yield for the environment, be innovative or still have a smaller market share than the alternative and be more expensive than the environmentally friendly alternative. The Environmental List is annually updated. Every year, investments that no longer meet the requirements as a result of technological advances are removed from the list or adapted, and new innovative investments are added.

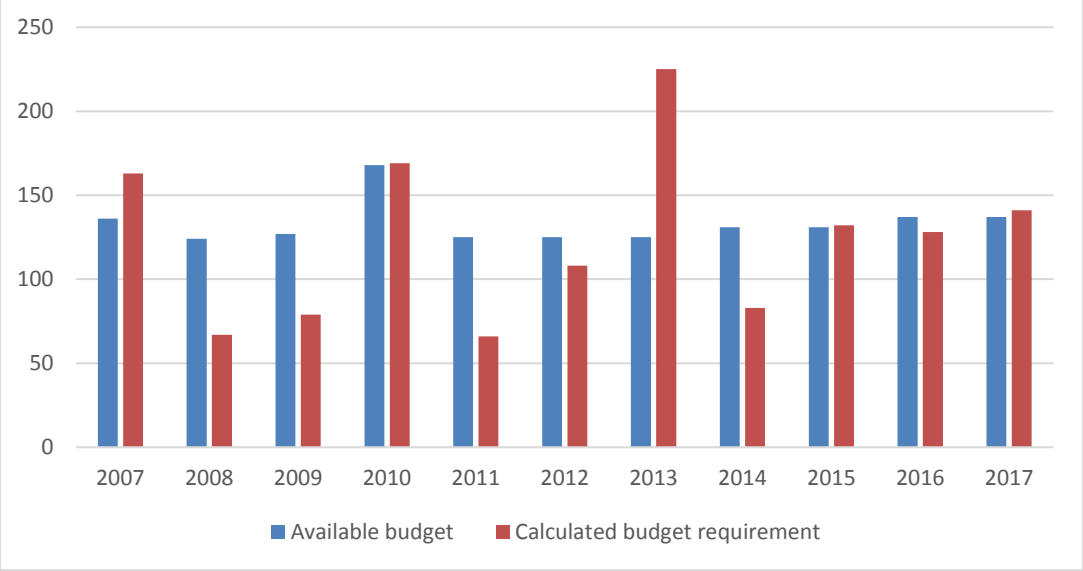
The current Environmental List contains 310 items of investment which cause less environmental damage and are often in advance of the legal requirements.

Budget

The MIA and VAMIL budget are set annually for each incentive and is funded by the central government. The budget is not always fully depleted, as expenditure varies each year depending on how many companies submit applications to the Tax and Customs Administration. In 2017, 40€ million was available for VAMIL and 97€ million for MIA. This means that the budget has remained the same as in 2016.

The figure below compares the available budget for MIA and VAMIL against the calculated budget for both schemes per year. The annual figures provide an overview of the total number of applications and the total investment amounts requested per business resource from the Environment List. This gives an indication on the extent to which entrepreneurs rely on the schemes. The calculated budget requirement in 2017 was a total of 141€ million. This is approximately 3% higher than the total budget reserved for 2017 and indicates that entrepreneurs rely on the schemes.

Figure 4.10: Available budget and calculated budget requirement (in € million) MIA and VAMIL



Source: based on data in www.rvomagazines.nl/miavamil

Prior to 2008, the scheme closed as soon as the available budget was exhausted. In order to prevent the scheme from having to close prematurely due to the budget being exhausted, the State Secretary for Finance decided in 2008 that over-exhaustion in one year may be compensated with under-exhaustion in other years. Since then, the scheme has not been closed prematurely. It is possible to use part of the budget for a following

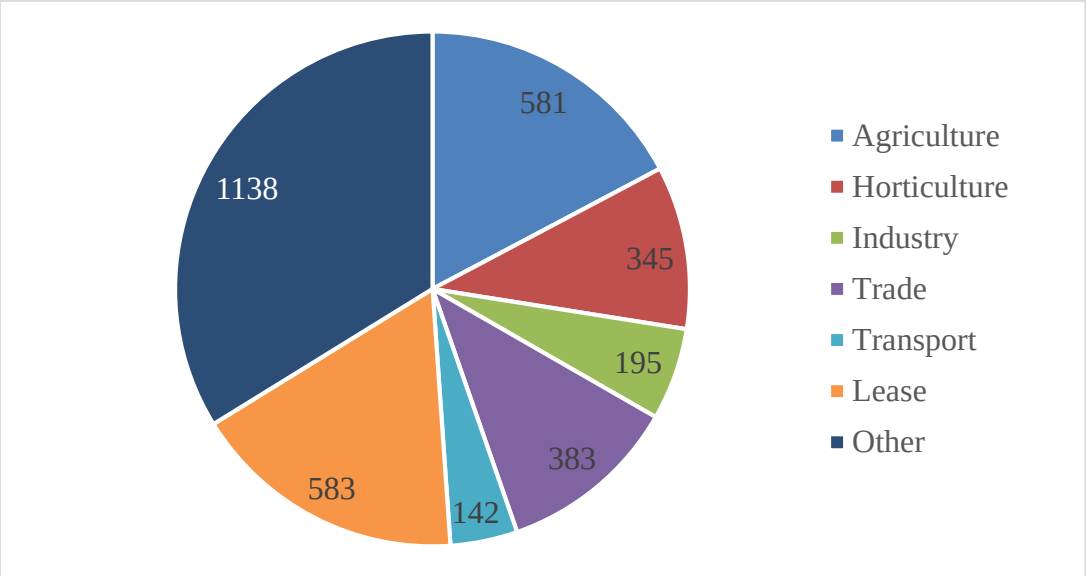
year and, also, to transfer excess budget to the coming year and the overrun of the available budget. For example, the overrun of the available budget in 2017 was compensated by underrun in 2014 and 2016.

Part of the budget comes from the governmental budget for the reduction of air pollution. The rest of the budget consists of foregone fiscal revenues of the government.

Beneficiaries

MIA and VAMIL supports entrepreneurs in all economic sectors that invest in the efficient use and recycling of raw materials. Figure 4.11 shows the investment amount by business sector in 2015. Agriculture and horticulture were responsible for 27% of the requested investment amount that year.

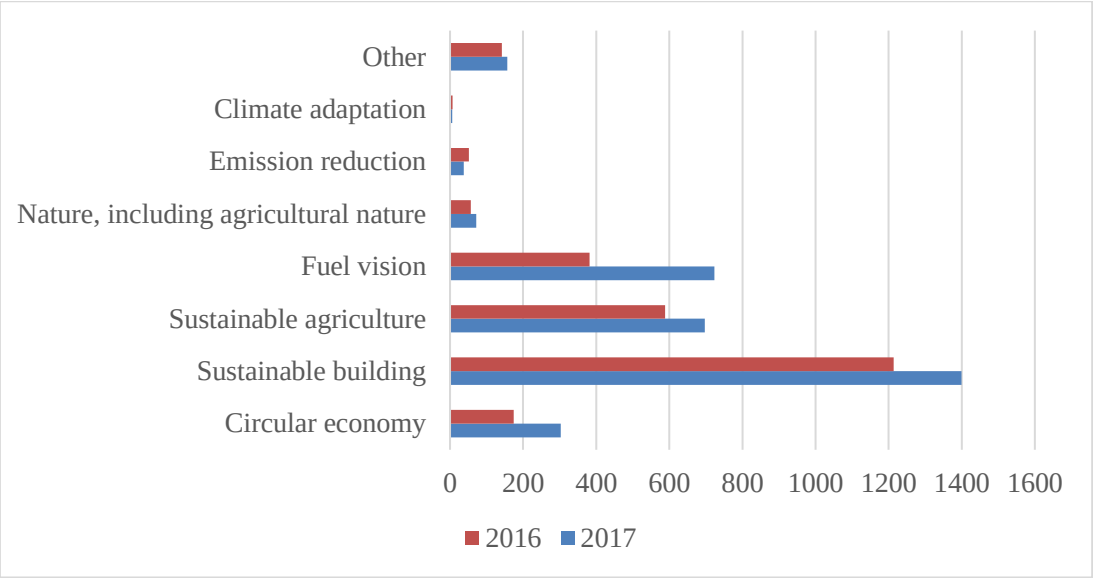
Figure 4.11: Investment amount by business sector (in € million)



Source: The Netherlands Enterprise Agency, 2016a

Investments are used for energy and resource efficiency projects. In 2017, entrepreneurs used the program more than in previous years for investments in recycling and saving resources. This increase is mainly the result of an increase in industry-related investments. About 250 million euros can be allocated to the industry. The other investments are mainly related to agriculture (The Netherlands Enterprise Agency, 2017a).

Figure 4.12: Reported investments 2017 by policy theme (in € million)



Source: based on data in The Netherlands Enterprise Agency, 2017a and 2016a

Actors involved

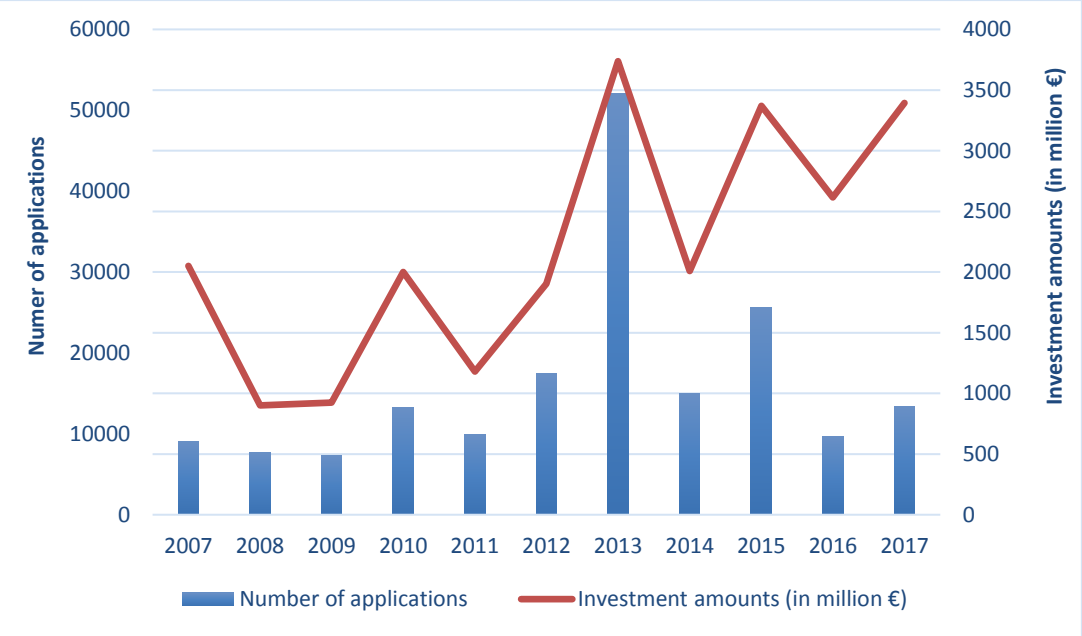
MIA and VAMIL are funded by the Ministries of Finance and Infrastructure and Water Management. The Netherlands Enterprise Agency and the Netherlands Tax and Customs Administration are responsible for operating the MIA and VAMIL. RVO.nl supports the compiling of the Environment list and is responsible for technical checks of the applications. The Tax and Customs Administration checks the tax returns and decides whether MIA/VAMIL can be applied.

Impact evaluation

Numbers of applications and the total amount invested varies per year. In good economic years, MIA and VAMIL are generally used more often than in years with a less favourable investment climate. The use of the scheme also depends on which operating assets are on the Environment List and what requirements are placed on the technologies.

In the annual report for the year 2018 data on total investments in MIA and VAMIL 2007-2017 have been published (see figure). In 2017, entrepreneurs again made extensive use of the MIA and VAMIL schemes. Compared to 2016, there has been an increase in the number of applications and an increase in the total investment amount reported for the schemes.

Figure 4.13: Number of applications and investment amounts (in € million) MIA and VAMIL program



Source: based on data in www.rvomagazines.nl/miavamil

The main strength of MIA and VAMIL are their simplicity for both companies and government. They are easy for business as the process for application is simple and straightforward and simple to enforce. On top of that MIA and VAMIL show low administrative costs (over the period 2002-2004 costs amounted to about 1.7% of the budget) and a very high multiplier effect (12€ of private investment per € of public spent).

Ongoing annual costs are approximately 1.5€ million. Research carried out by the Universities of Rotterdam and Tilburg into the design and effectiveness of incentives found that economic theory suggests that the schemes such as this should be quite cost effective if well implemented. Although unable to provide exact figures for the start-up costs, researchers concluded that they were relatively limited compared to the ongoing costs.

Energy Investment Allowance (EIA)

Context

The Energy Investment Allowance (EIA) is one of the schemes with which the Ministry of Economic Affairs and Climate supports companies in investing in innovative, energy-saving and sustainable technologies. In 2013, the government agreed in the Energy Agreement that it would focus the EIA as much as possible on

energy saving and no longer on renewable energy. This is because other schemes are available for sustainable energy.

Description

The Energy Investment Allowance (EIA) is a **tax relief** programme which gives a direct financial advantage to companies that invest in energy-saving equipment and sustainable energy. EIA applications can be made for the purchase or manufacturing costs of energy-efficient equipment. The energy-efficient equipment must save more energy than the prevailing equipment available on the market. This means that only the latest types of equipment are eligible for the EIA.

All SMEs registered in the Netherlands can qualify for the EIA tax relief for energy investments of a minimum of 2,500€ and a maximum of 113€ million in a calendar year as long as they invest in equipment that are on the so-called **Energy List**. A general EIA application can be submitted using an energy-saving calculation to demonstrate that equipment that is not on the energy list meets EIA standards. Proposals can be submitted for techniques to be included in a new energy list.

Box 4.2: The (EIA) Energy List

The Energy Lit is compiled annually by the Minister of Economic Affairs. Every year, technologies that reached a certain market share of which the costs decreased substantially are taken off the list. Companies can also fill a request to put a specific energy saving technology on the list. If the technology meets certain criteria it will be integrated in the list. In 2016, companies submitted 59 requests for adjustments or additions to the Energy List. This resulted in 31 new and changed technologies.

In 2017, the list contained a total of 164 techniques with a tax benefit (148 in 2016). The energy technologies on the Energy List can be applied in buildings, industrial processes, means of transport and sustainable energy. Entrepreneurs can also report packages of measures to improve the energy performance of existing company buildings.

From 2013 to 2015 the EIA deduction rate was 41.5 %, meaning that the tax advantage – based on a corporate tax rate of 25% – was roughly 10 %. As of 1 January 2016, the rate of deduction was increased to 58%, raising the tax advantage to approximately 14.5%. The result is an additional stimulus for energy saving. These changes have mainly been implemented to remove outdated technologies on the Energy List and to add new innovations. In addition, this is about arranging the EIA as effectively as possible for energy saving, as a result of the agreements in the Energy Agreement.

EIA and MIA cannot be used for the same investment element, although it is possible to combine the EIA with VAMIL.

Box 4.3. Example of net EIA benefit calculation

The taxable profit for 2019 is 500,000€. Corporation tax is 19% for the first tax bracket up to 200,000€ and 25% above 200,000€.

A business makes new energy investments amounting to 300,000€. The EIA is 45% of 300,000€, i.e. 135,000€. Therefore, the taxable profit is now 365,000€ (500,000€ - 135,000€).

Without the EIA the company would be liable for corporation tax of 113,000€. By making use of the EIA it pays corporation tax of only 79,250€. The tax benefit is 33,750€.

The net EIA benefit is about 11% of the investment cost.

Budget

The annual available budget (i.e. amount of money assigned to the grant measure) has increased between 2014 and 2017, from 111M€ to 166€ million.

Table 4.4: Annual budget, number of applicates and net benefit EIA program

		2014	2015	2016	2017	2018	2019
Available budget (in million €)		111	106	161	166	149	147
Budget used (in million €)		111	106	144	135	N.A.	N.A.
Number of applications		17,750	14,280	17,200	17,750	N.A.	N.A.
Amount invested (in million €)		1,608	1,375	1,346	1,519	N.A.	N.A.
Rate deducted from taxable profit		41.5%	41.5%	58%	45%	45%	45%
Net benefit	Million €	124	107	144	135	N.A.	N.A.
	%	10%		14.5%	13.5%		

Beneficiaries

EIA applications can be made by the following sectors: wholesale and retail trade, repair of cars; agriculture, forestry and fishing; industry; transport and storage; financial Institutions; rental of movable property and other business services; advice, research and other specialist business services; rental of and trade in real estate; accommodation, meals and drinks; health and welfare care; construction industry; others.

According to the Netherlands Enterprise Agency data, the industry reported the highest average amount per investment in 2016 and 2017. The largest number of applications

came from wholesale and retail (26% in 2016), followed by agriculture, forestry and fishing (20% in 2016) and industry (16% in 2016).

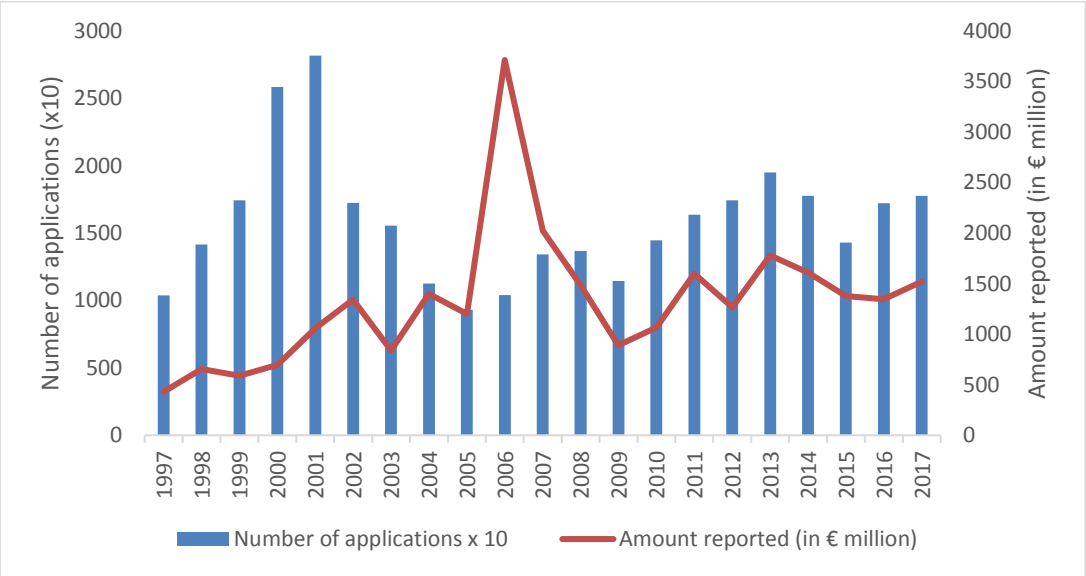
Actors involved

The EIA fiscal scheme was introduced and falls under the responsibility of the Minister of Finance and the Minister of Economic Affairs and Climate Policy. It is administered by the Netherlands Tax and Customs Administration and Netherlands Enterprise Agency (RVO), part of the Ministry of Economic Affairs and Climate Policy.
For each type of equipment, the applicant must submit a digital application form for the investment to RVO. RVO assesses the application and issues a declaration when the investment is eligible for the EIA. The exact amount that is eligible for the EIA is specified in the declaration.

Impact evaluation

Over the past 20 years, entrepreneurs have put together around 330,000 applications for around 28€ billion in investments in energy-saving technologies and renewable energy. The figure below shows how many EIA applications have been made and what the invested amount was between 1997 and 2017. The number of reports has grown slightly, while the amount invested in EIA applications has increased. The EIA has fluctuated between 14,000 and 19,500 applications in recent years. In terms of the reported amount, it has been between 1,300€ and 1,800€ million in recent years. 2017 appears to be an average year.

Figure 4.14: Number of applications and amount reported EIA program



Source: www.rvomagazines.nl/eia

Looking at the last two years reported, in can be observed that total amount that companies invested and reported to the EIA in 2017 increased by 13% compared to 2016. The number of EIA applications in 2017 rose slightly by 3% compared to 2016 to 17,748 applications. These applications were made by 10,653 different entrepreneurs. In 2017, entrepreneurs jointly applied for a deduction of approximately 1,519€ million in energy investments, thereby realizing an energy saving of 556 million Nm3 natural gas equivalent. For comparison: In 2016 the investment amount was 1,346€ million.

The Policy Assessment Energy Investment Allowance 2012-2017 shows that the EIA is a cost-effective scheme. It concludes that the cost-effectiveness of the EIA is relatively high from the perspective of companies, government and nationally. Over the period, a national cost effectiveness of 15-17€ per tonne CO_2 reduction has been estimated. The implementation and equipment costs are in line with other regulations.[24]

The investments where entrepreneurs made use of EIA in 2017 are expected to yield an energy saving of around 556 million m3 natural gas equivalent. Converted to CO_2 reduction, it is 980 kilotons per year. This energy efficiency achieved is comparable to the annual gas consumption of 350,000 households. [25]

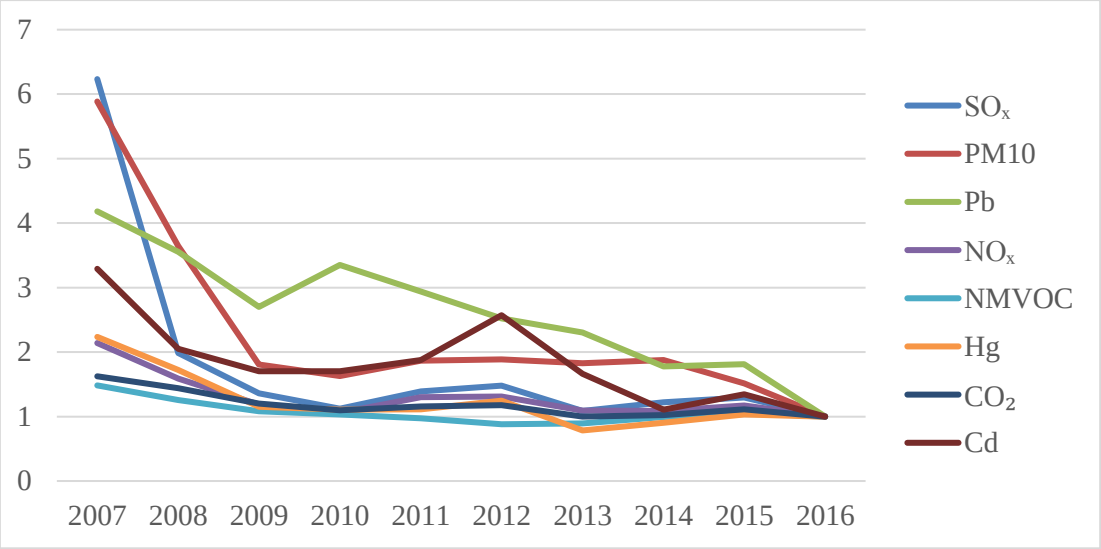
State economic incentives in the Basque Country (Spain)

Industrial sectors in Spain contributed in 2015 to 10% of the total GVA across all economic activities in the country. Energy – power accounted for 25% of the contribution and chemical industry to 17% (European Commission, 2018d). Industry makes up 24% of total energy demand. Three quarters is concentrated into the following five sub-sectors: metallurgy, non-metallic minerals, chemistry, food production and paper and paste.

Emissions to air by industry are shown in Figure 4.15. Emissions to air show decreasing trends for all pollutants in the period analysed, particularly between 2000 and 2009 due probably to the European economic crisis. After 2009, there has been a more static trend.

[24] https://www.rvomagazines.nl
[25] https://www.rvomagazines.nl

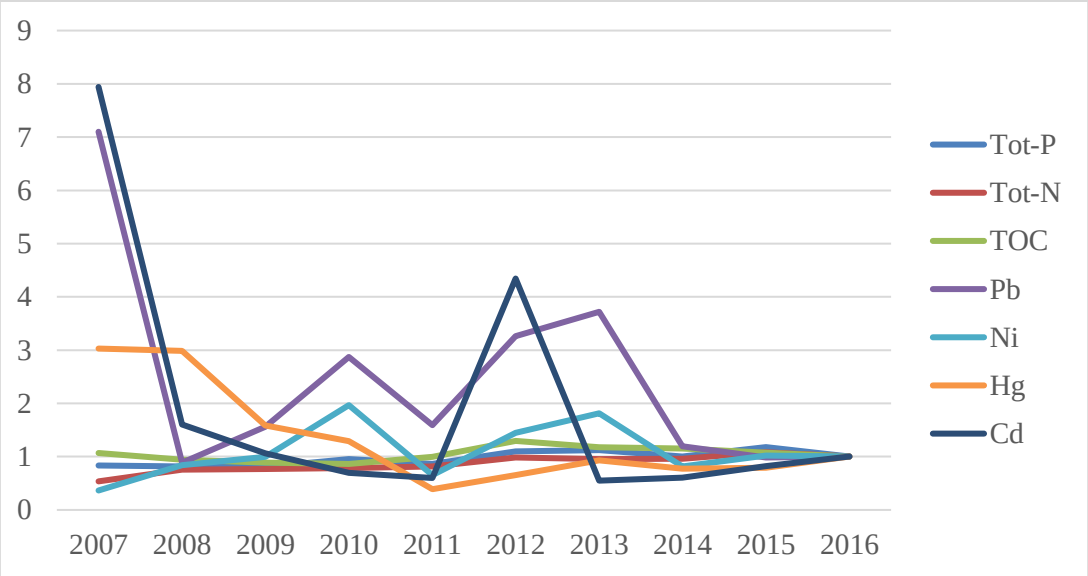
Figure 4.15: Industrial air emissions in Spain, 2007-2016 (indexed 2016=1)



Source: based on EEA data

Overall, industrial sectors are responsible for over half of Spain's total emissions to water of cyanides, AOX, PCBs, PDCC/F, Cd and Hg (European Commission, 2018d). Figure 4.16 shows the relative development of water pollutant emissions in industry from 2007 to 2015. It can be observed that Tot-P, Tot-N, TOC and Ni emissions to water have increased.

Figure 4.16: Industrial water emissions in Spain, 2007-2016 (indexed 2016=1)



Source: based on EEA data

Different measures intended to promote energy and resource efficiency in industry have been designed and implemented in Spain. These measures include the Basque Clean Technology List to accelerate BAT adoption in the industrial sector in the Basque Country, one of the most important industrial concentrations in Spain.

The Basque Clean Technology List

Context

The Basque Country has a long history of environmental policy which started back in the early 2000s with the Basque Strategy for Sustainable Development (2002-2020) and the Basque Environmental Programme (2002-2006). In the 1990s, this region had already a system of corporate tax deductions of 15% for environmental investments by companies exist based on demanding technical applications. In the early 2000, the Basque Clean Technology List (BCTL) based on the MIA scheme was developed to increase the percentage of investment that companies would be allowed to deduct.

Description

The Basque Clean Technology List (BCTL) consists of a list of industrial equipment developed and available on the market, with a **low degree of implementation** in the production sectors of the Basque Country and whose application is more efficient than the technologies conventionally used for that same purpose. It incorporates technologies with high application potential and direct impact on decreasing the consumption of resources and emissions.

The BCTL offers **corporate tax deduction of 30%** of the investment cost of the equipment included in the Basque Clean Technology List for **companies registered in the Basque Country**. Temporary and quantitative maximum limits to be deducted by a single company are in line with Commission Regulation on the ´**minimis aid**´ so that total amount aid to a single company shall not exceed €200,000 during any period of three tax years.

Box 4.4: The Basque Clean Technology List

The technologies to be included in the List are selected by the Ministry of Environment with inputs from the Ministry of Industry. Once the technologies have been selected using an ad hoc methodology, they are assessed by a Technical Committee including representatives from the Environmental Office, the Basque Environment Agency (Ihobe), the Business Development Agency (SPRI), the Basque Energy Agency (EVE) and the Tax Coordination Authority.

In 2016, the BCTL included 92 types of equipment. These include 32 renewable and energy efficiency technologies (e.g. a frequency inverter, a high-performance heat pump and a geothermic heat pump), 26 aimed at preventing and reducing air emissions (e.g. a particle filter), 12 water-related technologies (e.g. the membrane

bioreactor), 11 to minimise waste (e.g. grinding filter), and 10 to increase material efficiency.

The BCTL is reviewed every 3–4 years, when new technologies are added based on preliminary prospective studies and others are removed if they fail to meet the criteria. To be in the list, the equipment must be available on the market, must be innovative or have a low degree of implementation on the market, and it must be environmentally better than the State of the Art and what is required by environmental legislation.

Source: www.ihobe.eus

Beneficiaries

SMEs in all economic sectors

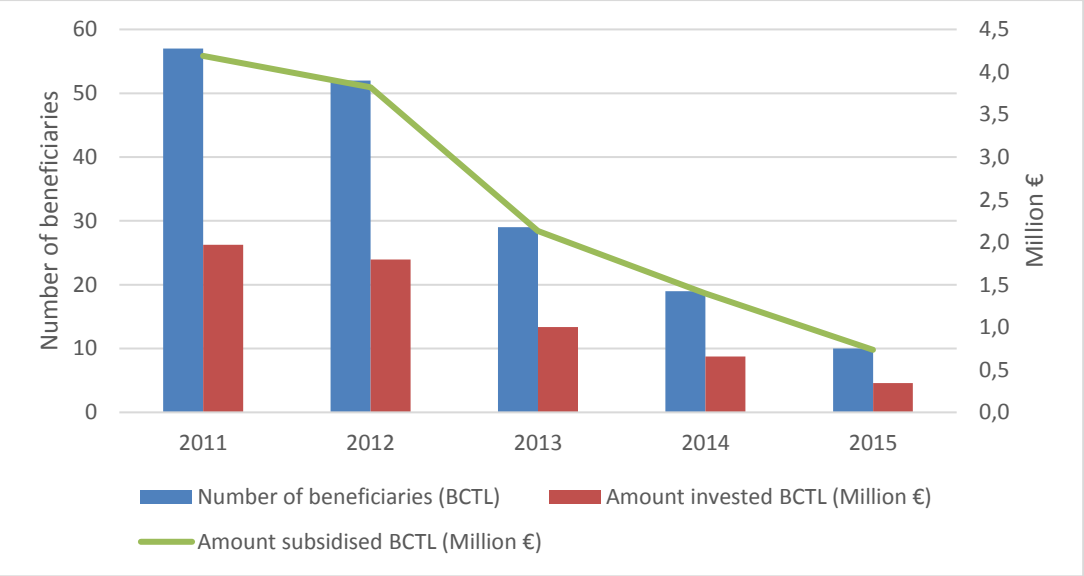
Agents involved

The BCTL instrument is managed by the Basque Environment Agency (IHOBE), in coordination with the energy and competitiveness agencies (SPRI and EVE) of the Ministry of Economic Development and Infrastructures, and with the Ministry of the Treasury and Economy of the Basque Government.

Budget and Impact

In the five-year period 2011-2015, a total of 167 companies have benefited from the deduction. These companies have invested around 77€ million in clean technologies, reaching a total subsidy of 12€ million. The figure below shows the number of beneficiaries, the invested amount and the subsidised amount between 2011 and 2015. Both the amount of the investment and the number of companies have decreased over this period.

Figure 4.17: Number of beneficiaries, amount invested and amount subsidised IEA program



Source: based on Basque Government, 2018[26]

As with the MIA scheme, the BCTL has **low administrative costs** (costs of managing, controlling, updating, and assessing represent 0.3% of the total of tax deductions implemented) and a big multiplier effect (4€ of private investment for each tax deduction €). **Simplicity and agility** are recognized as its main advantage, as the tax deduction is applied automatically in the annual corporation tax return.

Although the BCTL seems an adequate instrument to promote BAT implementation in industry, the number of applications has decreased over the years. This can however be explained by a number of reasons, including the economic crisis (Basque Government, 2018).

State economic incentives in Poland

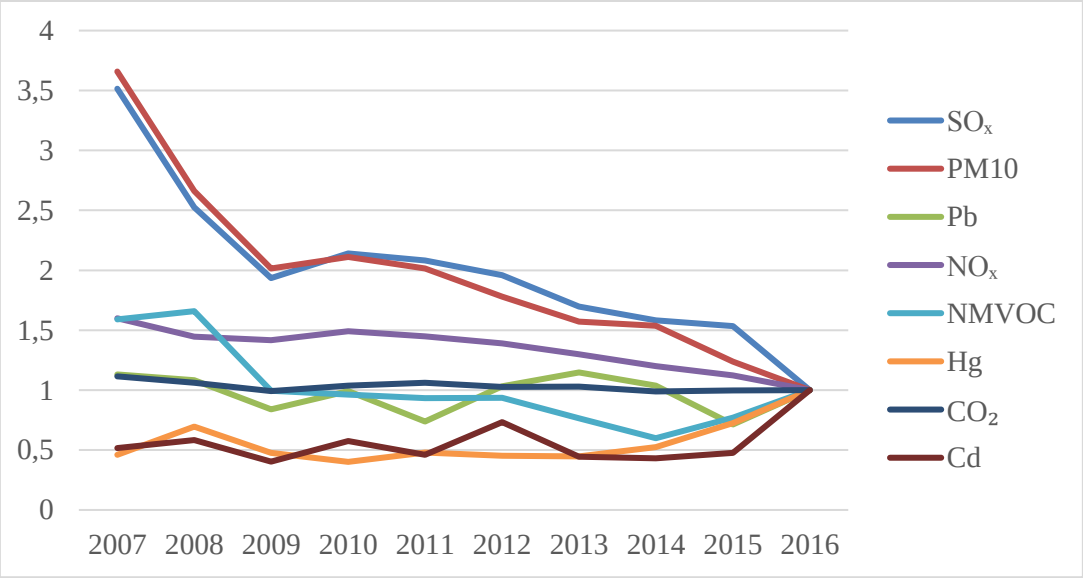
Industrial sectors in Poland account for 12% of the total GVA of the country. The industrial sector has grown in Poland in the period analysed, particularly 'other activities' and energy – power. This trend is not observed for the energy – refining, gasification and liquefaction, coke sector which has been in decline since 2012 (European Commission, 2018e).

[26] According to the Basque Environmental Program 2020 Evaluation Report 2017, 430 companies have benefited from tax deduction (167 that have invested in the BCTL and 263 in another type of environmental project) between 2011 and 2015. Together, they have invested a total of 198.1 million Euros, reaching a total subsidy of 31.8 million Euros.

The industrial sector in Poland represents a small share of the total energy consumption in the country (19%), with important differences in the relative weight of the specific industrial sectors. Energy use of industry decreased by around 1.2%/year between 2000 and 2015.

Industrial sectors are responsible for less than half of emissions of non-heavy metal pollutants emitted to air in Poland, except emissions of SO_x for which industrial sectors account for about 75% of the total. The contribution of industrial sectors to emissions of heavy metals is higher compared to the rest of the national total, representing more than 50% of emissions to air of Cd, As, Cu, Pb, Hg and Zn (European Commission, 2018e). Figure 4.18 shows industrial air emissions in Poland for the period 2007-2015. Decreasing trends can be observed for all air emissions with the exception of atmospheric mercury (Hg) emissions, which have increased.

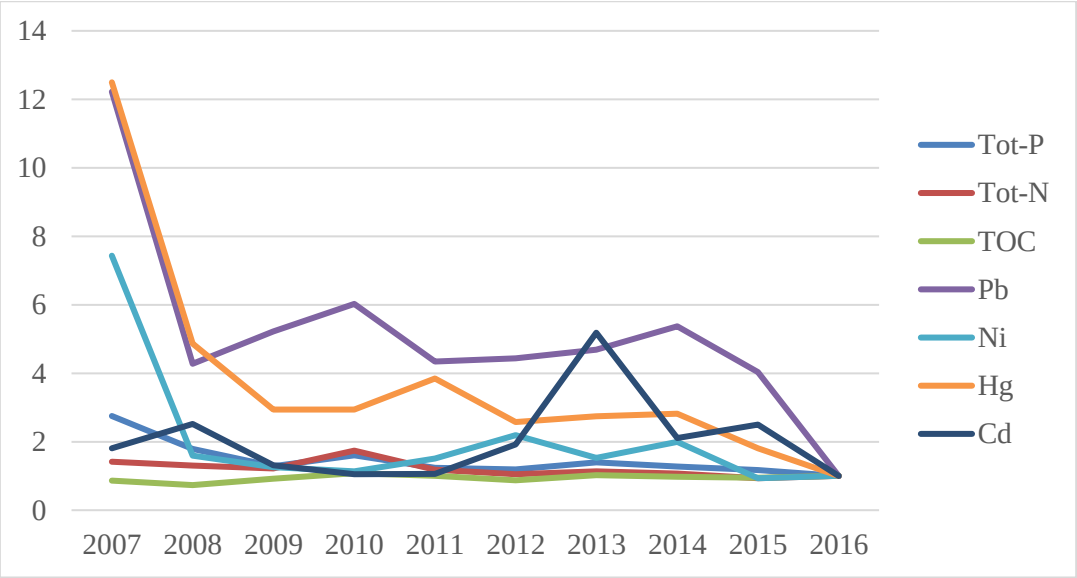
Figure 4.18: Industrial air emissions in Poland, 2007-2016 (indexed 2016=1)



Source: based on EEA data

Industrial sectors are responsible for less than half of the direct discharges to water in Poland (i.e. not via an urban wastewater treatment facility) (European Commission, 2018e). Industrial water emissions in Poland have decreased

Figure 4.18: Industrial water emissions in Poland, 2007-2016 (indexed 2016=1)



Different measures intended to promote energy and resource efficiency in industry have been designed and implemented in Poland. These measures include the Polish Sustainable Energy Financing Facility offering loans for financing energy and resource efficiency investments by SMEs.

Polish Sustainable Energy Financing Facility (PolSEFF I and PolSEFF II)

Description

PolSEFF is a credit line to help small and medium sized businesses in Poland invest in new, sustainable energy technologies. The program's objective was to overcome barriers faced by majority privately owned **Polish SMEs** (as defined by the European Commission)[27] to invest in energy efficiency and renewable energy and increase the number of energy efficient technologies and sources of renewable energy in the market. The program started in 2011 and ended in May 2014. It financed three types of investments in the form of leasing or loan:

- investments based on the List of Eligible Materials and Equipment (LEME). The List of Eligible Materials and Equipment (LEME) contains materials and equipment that had been verified and qualified by the PolSEFF engineers to result in energy savings of at least 20% or generate energy from renewable sources. One of the key benefits of the LEME list is a significant reduction in the project approval time. The time interval between the SME submitting its application and the project being approved does not usually exceed one week. The LEME list is accessible through the website to all interested equipment manufacturers and

[27] The number of your employees must not exceed 249 and revenue must not exceed €50 million or the company's balance sheet must not exceed €43 million.

dealers, financial institution staff, and SMEs. The web page allows SMEs and financial institutions to quickly identify eligible equipment for financing. It also allows manufacturers to submit new equipment for review by the programme's engineers. The LEME list includes over 7,600 products from 937 manufacturers and dealers.

- large scale energy efficiency, renewable energy and building sector projects
- investments of Suppliers.

Entrepreneurs who finance their investments within PolSEFF can get loans for 100% of the project cost. For complex projects improving energy efficiency (investments in renewable energy and commercial building refurbishment projects) the loan amount could be up to 1€ million, excluding investments based on devices from the list LEME (which may be maximum 250,000€). Companies are also entitled to a 10% or 15% grant of the leasing or loan value made available by the participating bank after the completion of the project. The program also offers free expertise to help you choose the investments that will be most effective.

Box 4.5: List of Eligible Materials and Equipment (LEME)

Automatic classification of investment projects as eligible for the PolSEFF program.

All materials and equipment registered on the LEME have been prequalified as eligible to be financed within PolSEFF. In order to finance the purchase and installation of the equipment registered on the LEME list, a SME simply needs to print the selected material and equipment certificate and present them at one of the banks participating in the PolSEFF. The LEME list assembles the most up-to-date energy efficient technologies available on the Polish market.

Expanded constantly

Every entrepreneur, producer, investor or equipment supplier can register specific equipment and/or material, which complies with the defined minimum performance criteria to the LEME list. Manufacturers and vendors of energy efficient equipment and materials may apply for registration to the LEME list after creating an account on the website and submitting the relevant technical information about the product businesses, that wish to purchase equipment that is not listed on the LEME list, should request their preferred supplier to register and submit the product of interest.

Applicants willing to install equipment not comprised in the list need to carry out an energy audit, in order to select the appropriate equipment the PolSEFF2 engineers review all candidate products before they are added to the LEME list company

registration, submission and final approval of compliant materials and equipment to the list is free of charge. You can submit any number of products.

Promotion for suppliers of the registered products.

An inclusion of equipment and/or material on the LEME list indicates that the products has been verified by independent energy experts. It provides a one-stop-shop for potential customers planning to invest in high energy-efficient performance equipment.

Source: www.polseff2.org

PolSEFF II is the second edition of the program. It started in 2014. Two types of investment projects are eligible to participate in the program:

- Energy Efficiency Improvement Projects. Investments in equipment, systems and processes that enable the beneficiaries to reduce primary and/or end use of electric energy, fuels or other types of energy. The financing value of energy efficiency projects using LEME technologies cannot exceed 250,000€. The financing value of complex projects improving energy efficiency based on individual solutions achieving minimum 20% of energy saving cannot exceed EUR 1€ million.

- Building Thermo-modernisation Projects. Energy efficiency measures in commercial and residential buildings that require energy performance certification and may include investments that generate energy from renewable sources. These investments must result in energy savings of at least 30%.

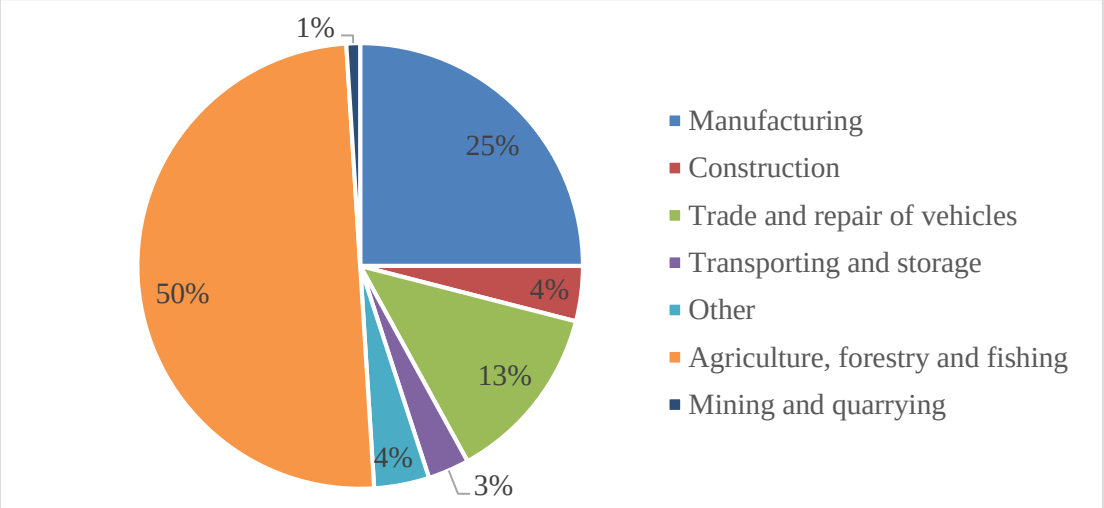
Budget

PolSEFF I was launched in January 2011 with an initial credit line of 150€ million and a grant support of 28€ million. As the awareness of the programme spread among Polish entrepreneurs, their interest to participate in the program grew dynamically. In order to meet the demand for financing under the programme, the EBRD increased the credit line to 180€ million in 2012. PolSEFF II, launched in 2014, will provide up to 200€ million credit line.

Beneficiaries

All economic sectors are eligible for funding under PolSEFF. Figure 4.19 shows PolSEFF projects distribution by sector.

Figure 4.19: Projects distribution by sector



Source: based on polseff.org data

Agents involved

The Polish Sustainable Financing Facility was initiated by the European Bank for Reconstruction and Development (EBRD) supported by the European Union. A credit line is made available to participating banks and leasing companies[28]. The Participating Financial Intermediaries (PFIs) then offer loans to SMEs for financing energy efficiency investments. Financing can only occur through collaborating with participating financing institutions.

One main difference between PolSEFF 1 and 2 is that the incentive payments in PolSEFF 2 will be provided and managed by a national counterpart, the Polish National Fund for Environmental Protection and Water Management (NFOS). In this way PolSEFF 2 involves the transfer of skills to national institutions. However, there is still uncertainty on how PolSEFF 2 will evolve and whether PFIs and NFOS will have the capacity to take over the leading role.

Impact

Since the beginning of the programme in 2011 until its end in May 2014, PolSEFF I financed 2,012 energy efficiency projects aimed at improving energy efficiency or generate renewable energy from more than 1,900 Polish SMEs. The projects resulted in energy savings of 342,843 MWh per year and reduced CO2 emissions by 101,868 tons per year (i.e. 305,604 tons for the period 2011-2014) at a cost of 186 million. Considering that the reductions will be for 20 years, the cost per ton saved can be estimated at around 30 €/ton.

[28] Phase I established partnerships with five major financial institutions (banks and leasing companies: Bank BGŻ, BGŻ Leasing, BNP Paribas Bank Polska, BZ WBK Leasing, Bank Millennium, Millennium Leasing, and Societe Generale Equipment Leasing Polska.

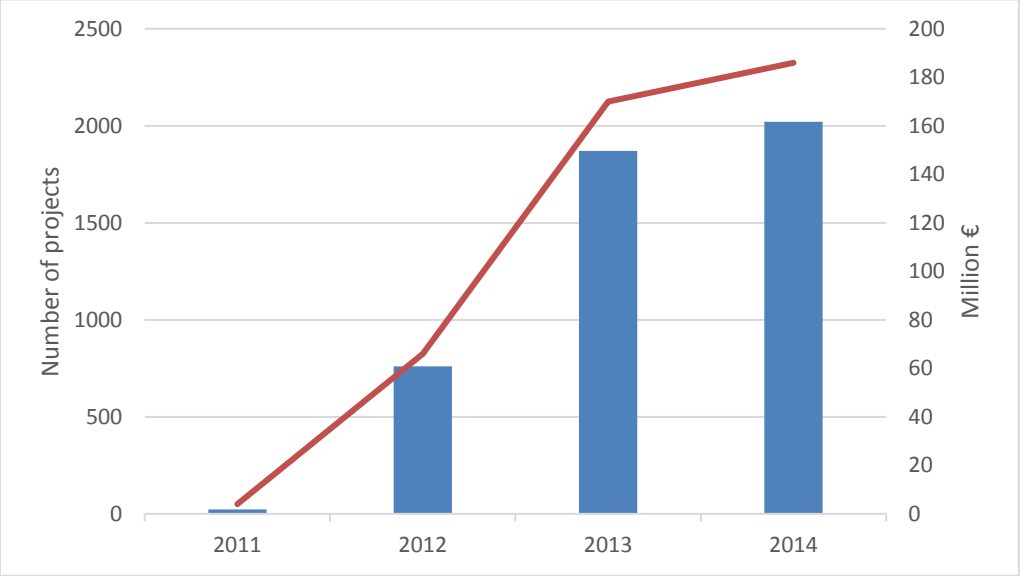
The leasing was the most popular form of financing within the programme: more than 70% of all investment projects were financed through leasing. The table and figure below present the results of PolSEFF I.

Table 4.5: Polish Sustainable Financing Facility results 2011-2014

Project type	Loan amount disbursed	Incentive paid	Number of projects financed	Primary energy savings	Estimated CO2 reduction
	Million €	Million €		MWh/year	t/year
Energy efficiency	176.7	17.2	1,936	272,594	77,073
Renewable energy	1,2	0.1	19	52,790	19,651
Building thermo-modernization	8.1	1.0	66	17,459	5,145
Total	**186**	**18.3**	**2,021**	**342,843**	**101,868**

Source: polseff.org

Figure 4.20: Projects financed, and loan volume disbursed 2011-2014



Source: based on polseff.org data

The PolSEFF programme has proven that the financing of energy efficiency investment projects in SMEs is an excellent opportunity for banks and leasing companies to acquire new customers and to provide existing customers with new attractive financial product (investment incentive) and services (experts advisory and reduction of the company's energy costs). Other benefits to the financial agents include differentiation, through a combination of 'business as usual' financing models and energy efficient investments; customer loyalty, as the investments results often exceed the original expectations.

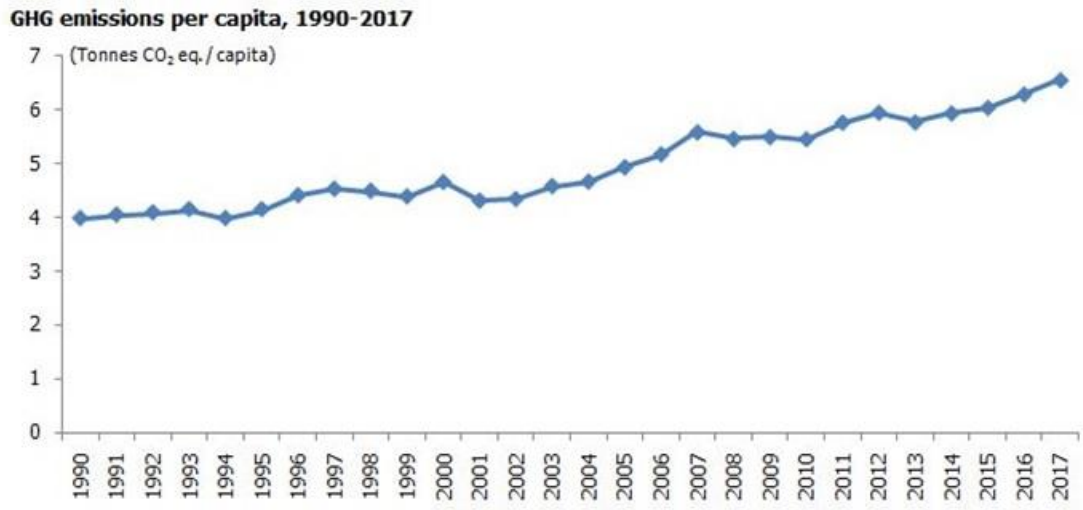
Implementation of PolSEFF 1 has been very successful in terms of funds utilisation and performance. This was so despite an incentive scheme seen as rather low (10 to 15 per cent of the loan amount) in the context of other sources of grants in Poland (up to 70 per cent of the loan amount) as explained in EBRD (2016). The main attraction of PolSEFF 1 may have been its relatively fast and easy procedures compared to other source of grants. PolSEFF 1 demonstrated that other levels of grants may well be higher than necessary as projects sponsors can still be incentivised to undertake energy efficiency investments with the lower incentive scheme of PolSEFF 1 (EBRD, 2016).[29]

State economic incentives in Turkey

According to OECD data, Turkey's economic growth between 2005 and 2017 was the highest in the OECD area. Although the economic growth has been relatively decoupled from air emissions, energy use, waste generation and water consumption, the country still faces many environmental challenges (OECD, 2019). Energy demand and GHG emissions need to be reduced, emissions of fine particulate matter need to be cut, and municipal waste management need to be better managed.

The overall GHG emissions as CO_2 equivalent for the year 2017 were 526.3 million tonnes (Mt). This is a 140% increase compared to the emissions in 1990. CO2 equivalent emissions per capita were 6.6 tonnes in 2017, while it was 4 tonnes for the year 1990 (see Figure 4.21)

Figure 4.21: GHG emissions per capita in Turkey, 1990-2017 (tonnes CO_2 eq.)



Source: Turkish Statistical Institute (http://www.turkstat.gov.tr/PreHaberBultenleri.do?id=30627)

[29] EBRD, 2016. Special Study: The EBRD's Sustainable Energy Finance Facilities (SEFFs)

In 2017, the energy sector accounted for the largest share of GHG emissions at 72%, followed by the industrial processes and product use with 12.6%. Turkish industry faces challenges related to the pressures placed by energy, water, waste and pollution consumption and management. Measures to encourage industry to adopt energy and resource efficient technologies have been put in place. One such measure is the Turkey Sustainable Energy Financing (TurSEFF) developed by the EBRD to finance resource efficiency and small-scale renewable energy investments.

The Turkey Sustainable Energy Financing Facility (TurSEFF)

Description

The Turkey Sustainable Energy Financing Facility (TurSEFF) is a programme developed to provide financing for Sustainable Energy and Resource Efficiency investments in the public and private sectors. It has been developed by the European Bank for Reconstruction and Development (EBRD) and has been supported by the European Union (EU) since 2010.

The maximum individual sub-loan or lease is 5€ million, while the maximum aggregate finance is 15€ million. All eligible equipment and measures are included in the **Technology Selector**. Loans are available for repayment terms of up to 5 years (Samuel O. et al., 2014).

Under TurSEFF 1 and 2 credit lines were provided by the EBRD to eligible commercial banks for on-lending to private sector borrowers. Under the new program, leases can also be offered by Project Financial Intermediaries (PFIs)[30]. Projects funded under TURSEFF must meet certain performance criteria. The figure below shows how the program works.

First, the SME develops an investment project and select a PFI to proceed with. Following selecting a PFI, the client applies to the PFI for TurSEFF finance and the PFI assesses the creditworthiness of the client. If found creditworthy, the project is forwarded to the Facility Consultant for financial and technical analysis.

[30] AKLease (www.aklease.com), Garanti Leasing (www.garantileasing.com.tr), QNB FinansLeasing (www.qnbfl.com), Türkiye Bankasi (www.isbank.com.tr), and VakifBank (www.vakifbank.com.tr)

For projects were the amount to be finance (loan/lease) is up to 250,000€ and with equipment and systems listed on Technology Selector, the Facility Consultant will only check compliance of the equipment with the minimum criteria set-up in the Technology Selector. For other projects (loan/lease amount up to 5,000,000€), the Facility Consultant performs a technical, financial and environmental eligibility screening of the project. If found eligible, the Facility Consultant prepares the Assessment Report that will support the investment and shares it with the PFI.

The client signs a loan/lease agreement with the selected PFI, and the loan or lease is lent to the client. The client implements the project. When the project is completed, the Facility Consultant will verify that the equipment has been properly installed and working in line with the Eligibility Assessment.

Budget

TurSEFF 1 (2011-2012) and TurSEFF 2 (2013-2016) utilized 600€ million of funds to finance more than 1,000 sub-projects and installed 500 MW renewable energy power. The total amount of the new phase of TurSEFF, starting in 2017, is 400€ million.

Beneficiaries

TurSEFF 1 (2011-2012) and TurSEFF 2 (2013-2016) financed energy-efficiency and small-scale renewable energy investments in industry and agriculture and commercial buildings (trade and service sectors). In 2017 a new phase of TurSEFF was launched, expanding the scope to water efficiency, material efficiency and waste management investments, and including the public facilities as eligible beneficiaries.

Agents involved

The TurSEFF was developed by the EBRD and has been supported by the EU since 2010. The programme is implemented by a consortium led by the private firm Stantec. Financial intermediaries play a central role in the program.

A team of local and international experts provide support to help prospective borrowers identify and develop Sustainable Energy and Resource Efficiency sub-projects and prepare successful loan or lease applications under TurSEFF. This technical assistance is funded by the EU.

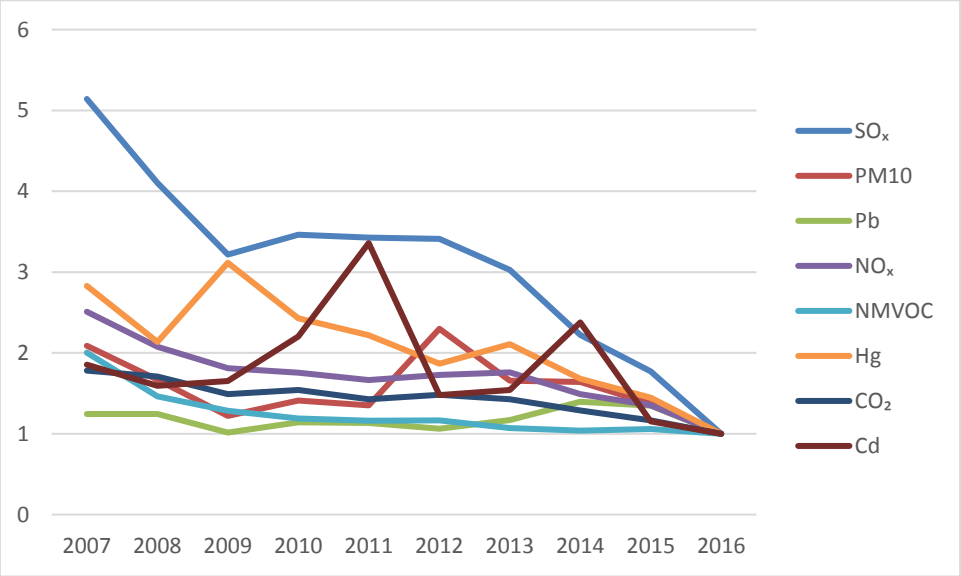
Impact

In its 8 years of operation, TurSEFF has utilized 600€ million of funds to finance 1,363 sub-projects and installed 500 MW renewable energy power. The total annual primary energy savings are equivalent to 400,000 toe per year (as of November 2017) and total annual CO2eq emission reduction exceeds 2 million tonnes (as of June 2017). Assuming a 20-year lifetime, CO2 savings can be estimated at around 40 million tons and the cost of CO2 savings is estimated at 5 €/ton saved.

State economic incentives in the UK

Industrial sectors in the UK contribute a 6% of the total GVA of the country and represent 11% of the national energy consumption (European Commission, 2018f). Emissions data are shown in Figure 4.22 indexed to 2016. All emissions to air except Pb show decreasing trends, particularly for NMVOC, Hg and NO_x.

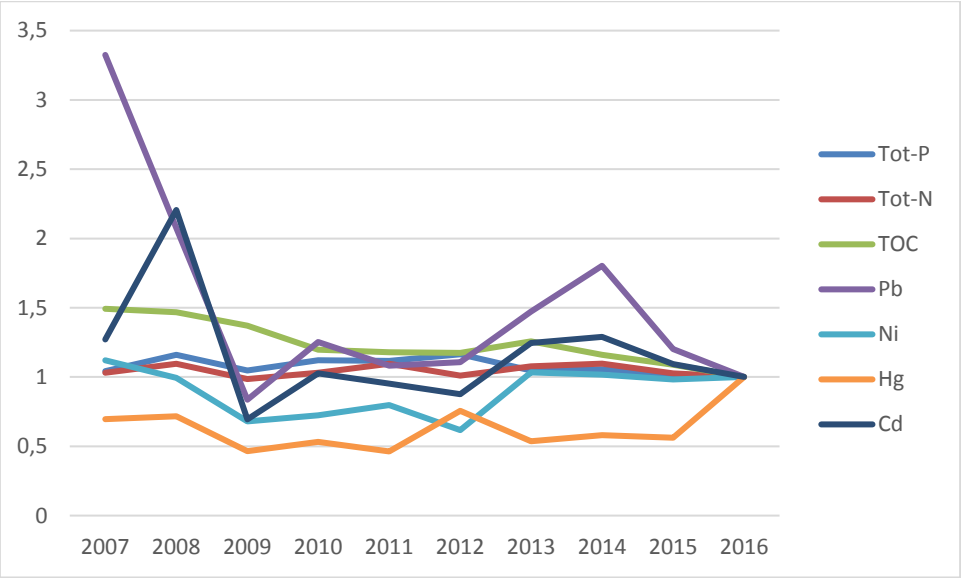
Figure 4.22: Industrial air pollution in the UK, 2007-2015 (indexed to 2016=1)



Source: base on EEA data

Industrial sectors are generally responsible for less than half of the emissions to water in the UK. The notable exception is the emissions of PCBs which originate entirely from the chemical sector, whilst emissions of cyanides also significantly emanate from the industrial sectors (European Commission, 2018f). Trends of industry emissions to water for the year 2015 are shown in Figure 4.23. All emissions to water show decreasing trends, with the exception of Hg.

Figure 4.23: Industrial water pollution in the UK, 2007-2016 (indexed to 2016=1)



Source: based on EEA data

The key policies targeting energy and resource efficiency within the UK industry sector comprise a mix of market-based instruments, including the Enhanced Capital Allowances (ECA) Schemes.

The Enhanced Capital Allowance (ECA) Schemes for energy saving and water-efficient technologies

Description

The Enhanced Capital Allowance (ECA) scheme for energy savings was introduced in 2001 to increase the take up of energy efficient equipment by industry. The ECA scheme for water efficient technologies was introduced in 2003. The schemes aim to reduce the consumption of energy and water by business, by encouraging their investment in the most efficient plant and machinery. This can help reduce overall energy costs and carbon emissions.

Any business that pays income or corporation tax in the UK will be able to claim 100% first year capital allowance on a product if it's on the **Energy Technology Product List** (ETPL) or the **Water Technology Product List** (WTPL) at the time of purchase. This means that the company can write off the cost of the new plant or machinery against the business's taxable profits in the financial year the purchase was made. When applying for the ECA, companies must hand in evidence that they bought the equipment. No advanced monitoring is required.

The ETPL includes energy saving qualifying products, while water efficient qualifying technologies are in the WTPL. The lists of technologies and products that qualify for

the schemes are reviewed every year by the Department for Business, Energy and Industrial Strategy (BEIS) in respect of the energy saving scheme, and by the Department for Environment, Food and Rural Affairs (Defra) in respect of water. This ensures that the lists remain relevant and that qualifying criteria are discussed with suppliers to ensure they remain accurate and effective. The annual update ensures that the lists reflect the changing market for energy saving and water efficient technologies.

For a product to appear in the Energy Technology Product List (ETPL) or in the Water Technology List (WTL), and therefore qualify for an ECA claim, it must meet a set of energy-saving (for the ETPL) or water-efficiency (for the WPTL) criteria. The criteria are published in an Energy Technology Criteria List (for the ETPL) or a Water Technology Criteria List (for the WTL) and are reviewed (and where necessary revised) on an annual basis, to reflect best practice. Eligibility criteria are published for each technology and sub-technology.

Box 4.6: The (ECA) Energy Technology Product List

The ETPL lists the products and technologies that are eligible for an ECA. The ETPL is a government managed free-to-use list of energy-efficient plant and machinery that provides organisations with the confidence that they are buying plant and machinery that demonstrates high standards of energy efficiency. This is backed by regular, independent evaluations of the market across 17 separate technology categories, providing a benchmark for what currently represents top performance. For a product to be on the ETPL, it must meet specific energy-saving or energy-efficient criteria. The Department for Business, Energy and Industrial Strategy (BEIS) annually reviews the technologies and products that qualify for inclusion.

New technology groups might be added as part of the annual review, but they must have the approval of the Department for Business, Energy and Industrial Strategy (BEIS), Her Majesty's Revenue and Customs (HMRC) and the Treasury. Also, manufacturers of energy efficient equipment can use the criteria to aid product development by using the Energy Technology Product List (ETPL).

Initially eight approved technology groups with sub-categories were put in place on the ECA scheme on 1 April 2001. The scheme has expanded in subsequent years and there are currently 57 technology categories and over 19,000 products (as of April 2019).

Budget

The ETL is managed by the Carbon Trust. DECC's overall budget for running the ETL is approximately £1.4 million per annum (i.e. administrative costs not including funding) is approximately €1.6 million per annum (DECC, 2015).[31] Around 240€ million are used to finance projects (Ryan et al. 2012).

[31] Department for Energy and Climate Change, 2015. The Energy Technology list: call for evidence

Beneficiaries

All businesses can claim the enhanced capital allowances, regardless of size, industrial or commercial sector, or location, for investment in a number of technology classes (provided it meets energy saving criteria), including: lighting, variable speed drives, pipe insulation, refrigeration, boilers, combined heat and power, motors and thermal screens.

Agents involved

HM Revenue and Customs is responsible for the tax-related aspects of the ECA scheme.

The ECA energy savings scheme is managed by the Carbon Trust[32] on behalf of the Department for Business, Energy and Industrial Strategy (BEIS). The Carbon Trust provides general guidance on how to claim tax relief through the ECA on its website. The website also provides access to the application forms. Furthermore, the Carbon Trust annually updates the ETPL list. The Carbon Trust also provides project advice on energy saving projects to companies. Advice on how to apply for the ECA can be part of the project advice.

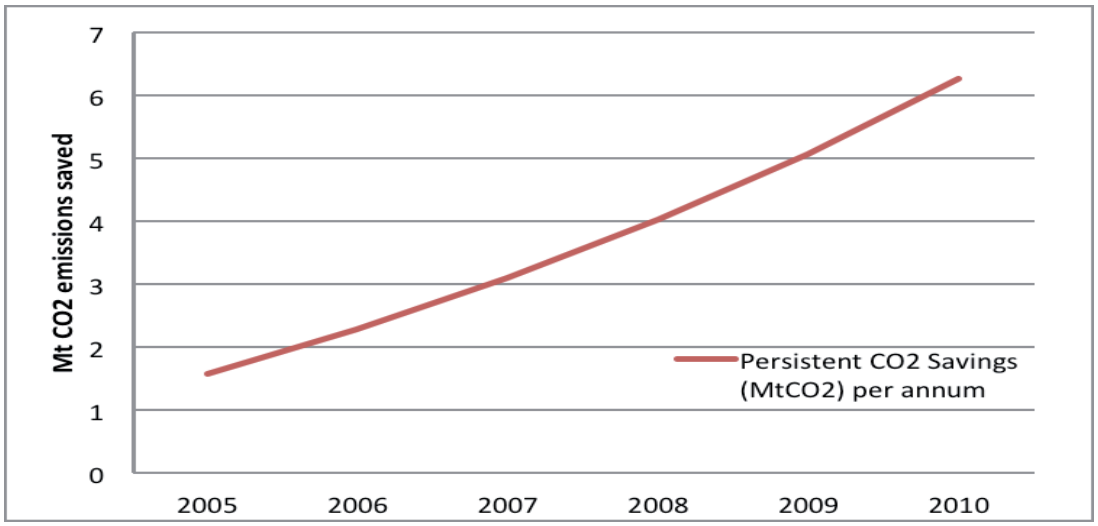
The ECA water scheme is managed by Ricardo Energy & Environment of behalf of the Department for Environment, Food and Rural Affairs (Defra).

Impact

The total amount of CO2 saved by purchases of all technologies covered by the ECA energy saving scheme was estimated at around 6.25 Million tons CO2 in 2010 (see figure below). These figures must be however interpreted with care, as not necessarily all 'real' carbon savings were entirely attributable to the ECA scheme because there is overlap with other measures (e.g. EU-ETS). Moreover, it must also be noted that it is estimated that at least 25% of the total savings would have also been achieved in the absence of the financial incentive from ECA. HM Revenue & Customs (2007)[33] did not find a direct causal link between the ECA scheme and businesses' purchasing behaviour but suggests it may have been one among various influencing factors.

[32] The Carbon Trust is an independent company that helps governments, organisations and companies reduce their carbon emissions and become more resource efficient.
[33] HM Revenue & Customs, 2007. Evaluation of ECA for Energy Saving Technologies

Figure 4.8: Estimated annual CO2 savings from ECA scheme for energy savings



Source: Ryan et al. 2012

The program can also bring significant financial savings in the short and long-term, incentivise businesses to purchase energy-saving technologies and realise a market transformation for energy efficient products. It also Improves company's energy-efficiency and its impact on the environment.

4.2. Lessons learn from the programs reviewed

Table 4.6 reviews and compares the findings for tax relief, loans and grants programmes for energy and resource efficient commercial equipment in the eight countries selected. Lessons learn from the implementation are summarised below.

Environmental effectiveness of the instruments

Following Ryan et al. (2012), the effectiveness of a policy is defined in this report as the extent to which a policy (i) meets its intended goals and (ii) realises positive environmental impacts. In the case of policy instruments for encouraging energy and resource efficiency, the goal is to increase the uptake of technologies that enable energy and resource (e.g. water and materials) savings.

Evaluating their environmental effectiveness thus, implies, in the first instance, determining if the programme was successful in encouraging the **adoption of** more energy and water **efficient technologies**. This is done by most countries analysed by looking at how the number of applications and qualifying investments awarded changed over time. To assess if the intervention has realised or not positive environmental impacts, most countries look at the **energy savings and/or CO_2 emissions savings** attributable to the programs must be estimated even though it is

acknowledged that the adoption of energy and resource efficient technologies have **other positive environmental impacts** (e.g. reduction of PM, Cd or Hg emission to air and water) as shown in section 4.1 above.

Adoption of more efficient technologies

The environmental impact can be evaluated by looking at the change on the number of companies or entrepreneurs that rely on the schemes, the invested amount and the calculated budget required. In the Netherlands, this is done and reported on an annual basis by the Netherlands Enterprise Agency (RVO) for both MIA/VAMIL and EIA schemes. The BCTL also keeps records of this information, although on a less systematic manner.

The 2014-2017 reports of the Netherlands MIA/VAMIL and EIA programs shows that the requested investment amount and, therefore, the claimed budget varies over the years. This is partly due to the operating assets that are on the Environment List and the requirements that are placed on the technologies. These requirements change annually, depending on the state of the art and legal obligations. The economic situation also plays a role in the fluctuation of the requested investment amount, with the scheme generally used more in good economic years than in less favourable ones. The MIA/VAMIL calculated budget requirement in 2017 was 141 million euros. This is approximately 3% higher than the total budget reserved for 2017 and indicates that entrepreneurs rely on the schemes. Over the past 20 years, entrepreneurs have put together around 330,000 EIA applications for around € 28 billion in investments, and it has fluctuated between 14,000 and 19,500 applications in recent years indicating a good rate of adoption of efficient technologies.

The analysis of the tax relief programs in the Netherlands and the United Kingdom allows to conclude that the level of uptake has been increasing as more companies are becoming aware of available tax credits, more qualifying products are being purchased and the amount of investment is increasing. Information reported in Basque Government (2017) shows that the number of applications and the amount financed by the BCTL has decreased over time. This means that the level of uptake has decreased, and that environmental effectiveness has, thus, also diminished. This can be explained by different factors, including the economic situation but also how the BCTL is managed. In this respect, the fact that de BCTL is only updated every 3 – 4 years may play an important role.

In its 8 years of operation, TurSEFF has utilized € 600 million of funds to finance 1,363 projects and installed 500 MW renewable energy power. PolSEFF 1 was launched in January 2011 with an initial credit line of EUR 150 million and a grant support of EUR 28 million, but the credit line was increased to EUR 180 million in 2012. Since the beginning of the programme, PolSEFF 1 financed 2,012 energy efficiency projects. An average of 5,000 applications are submitted each year to the German BMWi support for the use of highly efficient cross-cutting technologies program.

As with the Netherlands MIA/VAMIL and IEA programs, the above data indicates that entrepreneurs rely on the schemes and that a good rate of adoption of efficient technologies is taking place.

Table 4.6: Summary of programs in selected countries.

		Germany		Netherlands		Poland	Spain (Basque Country)	Turkey	United Kingdom
Name of instrument		KfW-EP	BMWi-EE	MIA/VAMIL	EIA	PolSEFF & PolSEFF-2	BCTL	TurSEFF	ECA Schemes
Type of incentive		Low interest loans (from 1.03%); financing share up to 100%	Grants; 20%-30% of net investment costs	MIA: Tax relief. 15-36% of investment cost Deductible. VAMIL: Accelerated depreciation. 75% write off in the first year of purchase	Tax relief. 44% of investment cost deductible from profits	Loans and leases (combined with grants)	Tax relief	Loans	Accelerated depreciation. 100 % write-off in the first year of purchase
Focus area		EE & EP	Cross-cutting technologies	Clean technologies	EE	EE & RE	Clean technologies		EE & WE
Budget (year)		1.3 B€ (2009); 3.2 B€ (2011)	10M€ (2012); 120 M€ (2017)	MIA= 97 M€; VAMIL=40 M€; Total=137 (2016)	161 M€ (2016); 149 M€ (2018)	186 M€ (2011-2014)	2 M€ (2016)	600 M€ (2011-16)	Around 240M€ (EE Scheme)
Main design element		-	-	LCT	EL	LEME	LCT	TS	ETPL and WTL
Target group		German and non-German enterprises of all sizes; self-employed	Enterprises of all sizes (SMEs in particular)	SMEs registered in the Netherlands	Entrepreneurs; companies	SMEs	SMEs	All Turkish enterprises	All UK enterprises
IMPACT									
Environmental effectiveness	Savings/ year	0.4 $MtCO_2e$ (2016); 2.8 $MtCO_2e$ (2020)	1.5 $MtCO_2e$ (2016); 4.3 $MtCO_2e$ (2020)	N.A.	0.98Mt CO2e (2017)	102 t/year	N.A.	2 $MtCO_2e$ (2017)	6.27Mt CO2e (2010)
	Applications	N.A.	N.A.	9,073 (2007); 13,430 (2017)	13,670 (2007); 17,750 (2017)	2,021 projects financed (2011-14)	167 (2011-15); 57 (2011)	1,363 projects	2,985 (2005; ETPL)
Cost efficiency		N.A.	1:4 (multiplier effect); 37.9 €/MWh saved	1:12 (multiplier effect)	€ 15-17 per tonne CO2 reduction	€ 30/ ton CO2 saved	1:4 (multiplier effect)	€ 15/ton CO2 saved	1:14 (multiplier effect)
Cost efficiency: Management costs		N.A.	99.21€ (per grant); 1.04 €/ ton CO2 saved	1.3% (of total budget)	N.A.	N.A.	0.3% (of total budget)	N.A.	1.2% (of total budget)
Strengths/ ***effectiveness***		Remove financial barriers		Simplicity & agility		Time reduction	Simplicity & agility	Time reduction	

Notes: EE = Energy Efficiency; EP = Environmental Protection; RE = Renewable Energy; LCT = List of Clean Technologies; LEME = List of Eligible Materials and Equipment; ETCL = Energy Technology Product List; WTL = Water Technology List; RVO = Netherlands Enterprise Agency; WE = Water Efficiency; TS = Technology Selector

Energy and/or emissions savings

The results of the analysis show that the tax relief, loans and grants programs for encouraging energy and resource efficiency in industry have achieved significant energy and CO_2 emissions savings. Their cost effectiveness, however, measured for example in terms of costs per ton of CO_2 removed, is not assessed in all cases and preliminary calculations show considerable variations across programs.

The UK ECA scheme appears to have achieved the most in terms of CO_2 savings. The total amount of CO_2 saved by purchases of all technologies covered by the UK ECA energy saving scheme was estimated at around 6.25 Mt CO_2 in 2010. The 2017 report of the Netherlands EIA program estimates that the investments in energy efficient technologies are expected to deliver cumulative CO_2 savings of 0.98 Mt CO2 in 2017. In its 8 years of operation, total annual CO_{2eq} emission reduction by TurSEFF has been estimated to exceed 2 million tonnes (as of June 2017).

Yearly savings in final energy in 2020 by the kfW Energy efficiency and Environmental Programme have been estimated in the range from 26 PJ to 18.3 PJ, while yearly savings in CO_2 emissions have been estimated to be 2.8 MtCO_2e in 2020. The final energy savings by the German Investment Grants for the Use of Highly Efficient Cross-Cutting Technologies funding program have been estimated to be 19 PJ in 2020. Yearly savings in CO_2 emissions are estimated to be 4.6 MtCO_2e in 2020.

These figures must be interpreted with care, as not necessarily all carbon savings can be entirely attributable to the tax relief, loans and grants programs, as there are at least two factors which may reinforce the positive environmental impact of the schemes:

- First, the EU emissions trading scheme and other policy instruments in place to encourage industry to reduce energy consumption may have been responsible for part of the energy and emissions savings.
- Second, some savings would have been achieved in the absence of the financial incentive due to freeriding. For example, the UK ECA estimated that at least 25% of the total savings would have achieved in the absence of the financial incentive from ECA. This may also be the case with the MIA and VAMIL program, and the Basque Clean Technology List. For the Netherlands EIA scheme, Ryan et al. (2012) assumed a ridership effect of 50%. Measures should be implemented to reduce the number of free-riders and increase the efficiency of the incentive.

The fact that most of these programs operate jointly with other policies suggests that fiscal (i.e. tax incentives) and financial (i.e. loans and grants) incentives may serve as a useful complementary measure and play a role in both CO_2 savings and technology uptake by industry.

Cost efficiency

For a policy to be cost-efficient, the objectives that want to be met need to be achieved at the least cost for both the public and the private sector (recipients of incentives and banks/institutions that have to administer support) compared to other policy instruments available. Evaluation the economic efficiency requires either undertaking cost-effectiveness analysis or looking at the extent to which the policy promotes innovation and continuous improvements in energy and resource efficiency. As cost-

benefit analysis are usually costly, the economic efficiency of policy instruments in industry tend to be determined looking at the costs and multiplier effects of programs. This measure of cost-effectiveness considers just the public budget perspective and not the cost of the investment for industry.

Total cost and multiplier effect

Available data shows multiplier effects variations across programs, although they tend to be quite high in all cases analysed. From a highest of 1:14 in the UK ECA scheme to a lowest of 1:4 in the Basque Country in Spain (Elgorriaga A. and Quintana I., 2018) and in Germany (EPATEE, 2018). The reasons behind these differences have not been analysed.

The German BMWi support for the use of highly efficient cross-cutting technologies in SMEs annual budget (i.e. amount of money assigned to the grant measure) has increased over the years, from 10M€ in 2012 to 120M€ in 2017. Total investment triggered by funding (i.e. Euros of total investment per Euro spent for funding) is estimated at 4.05€ (EPATEE, 2018)

The MIA and VAMIL budget are set annually for each incentive and is funded by the central government. In 2017, 40 million euro was available for VAMIL and € 97 million for MIA (the same as in 2016). The budget comes from the governmental budget for the reduction of air pollution and from the foregone fiscal revenues of the government. Based on currently available data, there is an estimated incentive effect of €12 from the private sector for each tax deduction euro in the Netherlands MIA and VAMIL program

The annual available EIA budget has increased between 2014 and 2017, from 111M€ to 166M€. This means that SMEs rely and using the program. The multiplier effect of the EIA program has not been analysed.

Based on currently available data, there is an estimated incentive effect of €4 from the private sector for each tax deduction euro in the BCTL program. The incentive effect from the private sector for each euro deducted is estimated to be 14 in the UK ECA scheme.

Cost per unit kWh or CO2 reduced

The cost efficiency of each program can be estimated dividing the total costs of the program (i.e. the administrative costs plus the cost of revenue foregone due to the tax relief) by the net energy savings or the net CO_2 savings. The net energy savings are the gross energy net of the estimated free rider, which for the UK was reported to be 25%. Assuming a free-ridership level of 50% for the Netherlands IEA scheme and the UK ECA scheme, the cost-effectiveness was estimated to be € 0.02/kWh for the Netherlands and €0.0052 for the UK (Ryan et al. 2012). In both cases, the cost is well below the average national industry price of electricity (electricity prices during the second half of 2018 were 0.1423 €/kWh in the UK and 0.0809 €/kWh in The

Netherlands)[34] indicating that the programs are relatively cost-effective. The cost per kWh saved in the German Investment Grants for the Use of Highly Efficient Cross-Cutting Technologies is estimated at 0.0379 €/kWh, which is also below the average German industry price of electricity (0.1516 €/kWh as of second half 2018).

The Netherlands IEA program appears to have a cost of € 15-17 per ton CO_2 reduction, while the cost per ton saved is estimated at around € 15 in TurSEFF and at approximate € 30 per ton CO2 saved in PolSEFF. These figures are below the carbon prices recommended by the High-Level Commission on Carbon Prices,[35] which have a range of US$ 40-80 (~€ 37-74) per metric tonne of CO_{2e} in 2020, rising to US$ 50-100 (~€ 46-92) per metric tonne of CO_{2e} by 2030 (all values are in real terms and in constant 2017 prices), also indicating that the programs are cost-effective.

Administrative cost

Although the total cost of the program (i.e. administrative cost + funding) should be used whenever possible as it shows a more accurate picture, the administrative costs (i.e. the total costs excluding budget) can also be used as a proxy of the cost-efficiency of programs. Overall, we can conclude that the administrative costs associated with the programs analysed do not appear to be high.

Data analysed shows that management costs of programs range from 0.3% of total budget for the BCTL to 1.3% of total budget for MIA and VAMIL. The UK ECA program appears to have a management cost of 1.2% of total budget. Total administrative cost (i.e. not including grant cost) of the German Investment Grants for the Use of Highly Efficient Cross-Cutting Technologies funding program is estimated at 99,21€ per granted action, 0.52€ per saved MWh and 1.04 € per saved t $CO_{2\text{-eq}}$.

Designing, managing and updating the "lists"

Most of programs analysed have a central element in the technology lists. The List of Clean Technologies (LCT) of the MIA and VAMIL tax relief program, the Energy List (EL) of the EIA accelerated depreciation program, the Basque Clean Technology List (BCTL) of the tax relief program in operation in the Basque Country, the List of Eligible Materials and Equipment (LEME) of the loans and/or leases used by the EBRD in Poland, and the Energy Technology Product List (ETPL) and the Water Technology List (WTL) of the UK ECA programs.

The role of the technology lists appears to be quite important in promoting resource and/ or energy efficient technologies in all countries for at least two reasons:

- First, the "lists" help overcome information barriers and provide technical performance information on technologies included on the list. The lists provide a good benchmark of the efficient technologies available on the market and provide

[34] Eurostat. Electricity price statistics

[35] N. Stern and J. E. Stiglitz (2017). Report of the High-Level Commission on Carbon Prices. World Bank. Available at: https://www.carbonpricingleadership.org/report-of-the-highlevel-commission-on-carbon-prices/

firms with a clear source of information on the energy performance of the products they are deciding to invest in. This encourages firms to invest in listed products.

- Second, the "lists" serve as an accreditation list for qualifying products and are an excellent promotion method for suppliers of the registered products. This encourages suppliers to participate in the schemes and it also helps increase awareness of potential energy and/or materials savings.

There are several design features that must be considered to ensure the good operation of the list:

- The products included on the list should fulfil several criteria: (i) they should be energy and/or resource efficient and have higher than average energy and/or resource efficiency performance; (ii) hey should be those with a higher payback period and therefore incur greater initial cost than more average products; (iii) they should be at an early stage of diffusion and deployment in the market.
- The list should be updated frequently to ensure that the products on the list continue to meet the previous criteria and keep in line with market developments. The lists of all programs analysed are updated at least on an annual basis. The only exception is the BCTL, which is updated every 3 – 4 years.
- User-friendly, easy to use and unbureaucratic. The LEME list is probably a good case here. In order to get finance for the purchase and installation of any equipment registered on the LEME list, a SME simply needs to print the selected material and equipment certificate (available on the webpages of individual materials and equipment) and present them at one of the banks participating in the PolSEFF2. The main strength of MIA and VAMIL are their simplicity for both companies and government. They are easy for business as the process for application is simple and straightforward and simple to enforce (Elgorriaga and Quintana, 2018)[36]. On the opposite, the UK technology sector concluded in 2016 that the UK ETPL is too resource intensive for buyers to use it, especially for SMEs and more so if they want to finance a wide range of qualifying products. Complexity means that interaction with the list needs to be outsourced to third party specialists, which is something SMEs cannot always afford.
- Awareness of the list.

One of the dangers of providing preferential treatment (in the form of tax deductions, accelerated depreciation, loans or grants) to specific equipment is the risk of technology lock-in. In other words, by promoting the adoption of certain technologies, the incentive may prevent the adoption of more efficient technologies that may appear in the future. The technology list plays a very important role in avoiding the technological lock-in. Any list that does not fulfil the above-mentioned criteria and that it is not update frequently enough can cause technology lock-in and make the

[36] Elgorriaga Kunze, Ander & Quintana San Miguel, Ignacio. (2018). Results of Three Cost-Effective, Innovative and Transferable Resource-Efficiency Instruments for Industries in the Basque Country. 10.1007/978-3-319-50079-9_14.

incentives program fail. A list with a set of criteria based on the most energy and resource efficient products and with continuous updates to ensure that the list is in line with industry developments and includes the latest technologies for improving energy and resource efficiency, helps avoid technology lock-in. A list that specifies the environmental performance required for technologies to be eligible and not the eligible technologies as such, is likely to reduce the possibility of technological lock-in.

The role of financial intermediaries in loans programs

The role of PFIs is consider very important for loans and leases programs (EBRD, 2016). The financial partners will ease the SME process in the way for financial support. A credit line is usually made available to financial partners (banks and leasing companies). The Participating Financial Intermediaries (PFIs) then offer loans to SMEs for financing investments and guide the SME during the whole process. Financing can only occur through collaborating with participating financing institutions.

The loans programs are also an excellent opportunity for banks and leasing companies to acquire new customers and to provide existing customers with new attractive financial product and services.

5. Recommendations for an effective and efficient implementation of economic push instruments in Russia

This chapter provides recommendations for the economic push instruments that could accelerate BAT adoption in Russia. Two kind of instruments are discussed, those directly mobilizing public funds (e.g. subsidies and loans) and tax exemptions that create incentives for private parties to carry out extra investment in BAT.

5.1. Financial Needs of BAT

There are two major positions with respect to the cost of implementing BAT in Russia. On the one hand, the analysis from the Government of Russia (Ministry of Environment and Natural Resources of Russia, 2019) shows that for the majority of sectors the assessed level of investment into the BAT would not exceed historically observed level of capital investment. Assessments of the costs of transition for the energy sector support the view that the costs may be on the lower end of the spectrum, as discuss earlier. However, on the other hand, Russian business has expressed a lot of concern about the cost of the BAT implementation and there has been strong disagreement from the business community with respect to the speed of adoption.

At the higher end, an estimated total cost for the category I enterprises to comply with BAT will be around 8.2 trillion RUB in 2016 prices (i.e. approximately 820 billion RUB per year), equivalent to 11.05€ billion (i.e. approximately 1,105€ million per year). Other studies suggested a lower figure in the range of 4-8 trillion RUB (i.e. approximately 400 – 800 billion RUB per year if we consider that the roll out of the BAT program takes 10 years), equivalent to approximately 5.39 – 10.78€ billion (i.e. approximately 539 – 1,078€ million per year).

In order to design an effective financing support program, it would be important to enhance the understanding of the financial needs and capabilities of the Russian industry. Therefore, the following two specific actions are recommended:

- To undertake **an in-depth analysis to obtain accurate and reliable estimates of the costs of implementing BAT across sectors up to 5 years**. While some assessments have been previously done, information exchanges with Russian experts suggest that earlier figures are not very reliable. This work could be undertaken with the use of a comprehensive survey on the financial and investment needs for BAT to be carried out in a representative number of companies within each affected sector. The survey will focus on how much each enterprise plans to invest in BATs and what share of these resources need to be borrowed from the financial system. Estimated needs for each sector for the next 5 years could be aggregated, exploring the expected sources to finance the investment plans. By comparing the BAT investment requirements and planned investments in new technologies a **financing gap** can be estimated.

- **Longer term investment plans estimations** (between 6-10 years) will be more difficult to determine but it may be possible to make a reliable estimate based on indicative policies and use them to derive a financing gap for those years. Assuming that enterprises will comply eventually with the BAT regulations as per law No. 219-F, investment programs for the period after the next 5 years can be determined based on what remains to be done to be in eventual compliance by the end of the 10-year period (i.e. by 2029 at the latest[37]).

It is important to note that obtaining accurate and reliable estimates of the costs of implementing BAT across sectors is important not only from the point of the costs, but also in terms of valuing an opportunity for the financial sector and for other actors that would be key to support the transition to the BAT in Russia. Credible and transparent analysis and its wide communication would help attract interest of such players to participate in the market supporting BAT transition.

5.2. Filling the Gap: Existing Sources of Additional Finance

The limited evidence and expert opinions in Russia suggest that the limited own resources currently available for financing BAT adoption in companies as well as the not so attractive terms to access external funds make it highly challenging to cover the total cost of compliance with the provisions of the law with respect to BAT implementation. To address this expected financing gap, it will be necessary to (a) **identify possible additional sources of finance** and/or (b) **to assess the terms on which the existing enterprises could consider increasing their level of investment**.

5.3. Effectiveness of the investments already in place and previous experience of economic support to environmental investments in Russia

Russian legislation stipulates the provision of state support for business to protect the environment. The law also introduces specific economic instruments to facilitate the transition and to support the enterprises in adopting BATs. Economic instruments have been reviewed in section 3 of this report. As the effectiveness of the current economic instruments in place (e.g. environmental charges and other instruments) has not been analysed yet, it would be worth considering conducting a study on the effectiveness of these instruments, and to analyse if some of these instruments can potentially be adapted to be used as cost-effective sources of additional finance.

For example, analysing the uptake and effectiveness of the current tax credit schemes in Russia open for certain types of investments and of the experience with accelerated depreciation scheme would deliver useful insights into what steps can be taken to achieve greater uptake of the instrument by the private sector and the necessary

[37] Technically they should be in compliance by 2025 but, as this is unlikely, we have allowed a 10 year period asking us to 2029.

modifications to the existing schemes to stimulate at scale investment to the BAT. It would also be useful to analyse statistics on the use of the existing support measures in the form of subsidies and soft loans that are presented in the Ministry of Industry and Trade's database mentioned in Chapter 3 and to interview targeted industries on their experience with using the programmes.

Similarly, it would also be important to undertake an in-depth evaluation of the previous experiences with using economic support instruments for environmentally friendly investments in Russia and draw lessons for the BAT support schemes. These could include the earlier lessons from the National Abatement Pollution Facility (NPAF), as well as the experience of the sector-specific programmes such as Sustainable Energy Finance Facility (RUSEFF), Russia Sustainable Energy Finance Program (RSEFP) and other targeted credit lines.

Existing financial sources in the country include (1) Enterprises' internal funds, (2) subsidies and loans from public funds in the form of (a) direct subsidies from the federal and regional budget through targeted programs, (b) special financial institutions such as State Fund for Industrial Development and its regional equivalents that can support targeted programs, and (c) subsidies for coupon payment on green bonds.

The following sections focus in how can existing instruments be potentially adapted to get this additional finance and fill the financial gap. For this purpose, the report links recommendations on policy instruments to the barriers identified in chapter 3 and what has been learnt from past experiences in Europe (chapter 4). The main barriers to overcome include high administrative costs, short lending periods and high interest rates.

The analysis of the European experience with tax incentives, subsidies and loans programs suggests that three key areas could be considered in the design of the Russia's incentive schemes for the BAT transition. These are: ***(i) design, evolution and status of the approved technology list in relation to the incentives***; ***(ii) lowering administrative burden for the state and for the business in application of the incentives***; (***iii) assessing the necessary level of incentives (e.g. tax relief or loan interest rate) in Russia and eligibility of different types of enterprises and types of spending***. These are discussed below.

5.4. Design, evolution and status of the approved technology list

One of the key elements of the success and smooth operation of incentives schemes considered is the existence of an energy/ environmental/ clean technology list that determines which equipment is eligible for the incentive. The list is a common feature in both loan (Poland and Turkey) and tax relief (the Netherlands, the Basque Country in Spain, and the UK) schemes. This could be a newly created list or be based on the **existing list of eligible investment for BAT equipment**.

The list will **simplify and accelerate procedures** for both business and program managers while keeping the system transparent, credible and robust. This was the case, for example, with the List of Eligible Materials and Equipment (LEME) of the PolSEFF credit line scheme. PolSEFF acknowledges that one of the key benefits of the LEME list is a significant reduction in the project approval time. PolSEFF and TurSEFF, the Turkish loan scheme, also offer free support to businesses in completing the required application forms and conduct the required technical and financial evaluation of the project. In the Polish case, this is done by Certified Energy Experts who also provide energy audits and verify that the investments qualify for financing. These services are provided free of charge thanks to funding provided by the European Union.

The technology list will also play a very important role in avoiding the technological lock-in, which is one of the dangers of providing preferential treatment to specific equipment.

Experts at the workshop were concerned about the current system of financial incentives (including soft loans and subsidies), as it is mainly geared to support technology producers (in particular, import substituting technologies) rather than polluting enterprises that need to modernise and invest into adoption of the BATs. The technology list will also enable to **balance the interests of technology producers and polluting enterprises**.

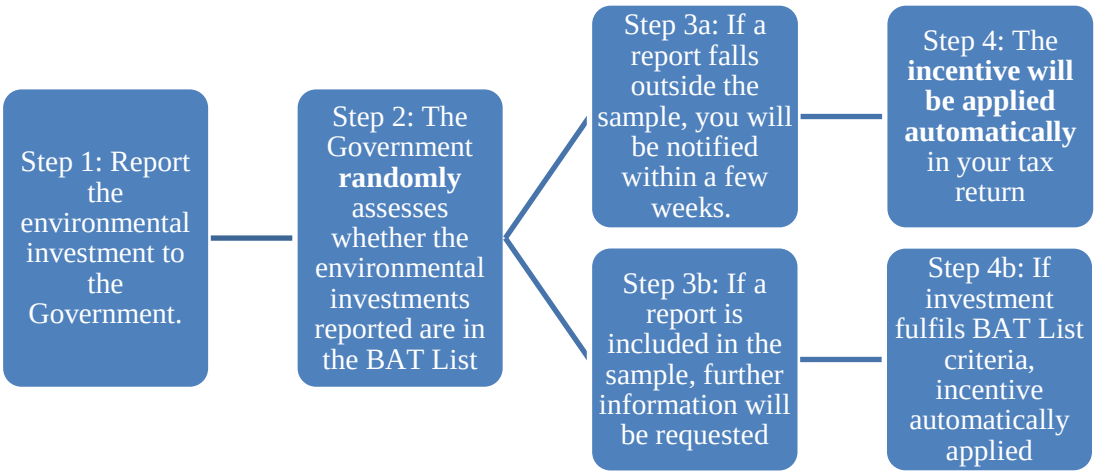
Trusted technology lists set a performance threshold for best performing energy and/or resource efficient equipment available to the market. This threshold is used by qualifying equipment that can be included in the list. **Any technology that is included on the list is eligible for the incentive, regardless of how much environmental improvement it delivers**. As all equipment in the list are eligible for the incentive, business will purchase equipment included in the list. Thus, the list acts as an incentive to purchase the most efficient products. As customers purchase products in the list, this encourages manufacturers to include products in the list and to develop new products that meet the performance threshold.

A well-designed BAT List should comply with certain rules:

- Clear and relatively **regular timeframe for updates**. A list with a set of criteria based on the most energy and resource efficient equipment and with continuous updates to ensure that the list is in line with industry developments and includes the latest technologies for improving energy and resource efficiency, helps avoid technology lock-in. The Energy Technology List (ETL) and the Environmental List (EL) in the Netherlands, and the Energy Technology List in the UK are updated annually. Every year new technologies can be added to the list and investments that reached a certain market penetration, had their price reduced substantially or no longer meet the requirements as a result of technological advances are removed from the list.

- Transparent procedure on how and by whom **new technologies/ equipment can be proposed** for the list. In the Dutch and the UK lists every entrepreneur, producer, investor or equipment supplier can submit a proposal to include a new technology in the list (the equipment will be included if it complies with the defined minimum performance criteria). More than one Ministry are usually involved in drawing up and updating the list.
- Accessible through a **usable website** to all interested equipment manufacturers and dealers, financial institution staff, and SMEs. Lists such as LEME and the EL are accessible through the web.

The system will work as follows (see below): a business that makes a capital investment in an equipment on the BAT List submits a report on the investment to the Government (e.g. the Ministry of Natural Resources and Environment). The Ministry of Natural Resources and Environment will randomly assess whether the investment is included in the List or not and, therefore, whether it is eligible for the incentive or not. If a report falls outside the sample to be assessed, the incentive will be applied automatically in the business tax declaration. If a report is included in the sample, further information will be requested before a decision can be taken regarding the eligibility of the investment.



Apart from the Ministry of Natural Resources and Environment, other Ministries and private stakeholders (e.g. suppliers of import-substituting equipment, consultants) will need to be involved in the scheme.

Table 5.1: Agents potentially involved in the design of the BAT list

Agents potentially involved	Potential Role
Ministry of Finance	Provides funding
Federal Taxation Service. Ministry of Finance	Tax related aspects of the scheme

Ministry of Natural Resources and Environment	Technical checks of the application Drawing up/updating the list
Ministry of Industry and Trade	Drawing up/ updating the list
Suppliers of equipment	Provide equipment Propose new equipment/ technology to be included in the List
Consultants	Assist business applying for the incentive, when needed

Stakeholders noted that the development of a list of eligible equipment for economic incentives was quite reasonable. A technology list based on the lists of BATs given in the industry information and technical reference books on BAT (BAT ITS) already exists in Russia. However, only technologies from BAT ITS developed in 2015-2016 are included in the Russian list and a lot of the technologies included are obsolete. Therefore, the existing list of BAT needs to be updated based on criteria for classifying technology as a BAT (regulated by Federal Law No. 7-FZ dated January 10, 2002, and Order of the Ministry of Industry of the Russian Federation No. 665 dated March 31, 2015).

According to Russian legislation, the BAT ITS must be updated every ten years. However, European experience shows that an annual update is common so that seems quite a long period. At the working meeting with industry and administration representatives it was reckoned that the annual update of the list allows to quickly respond to the appearance on the market of new promising technologies and stimulates healthy competition among equipment manufacturers. However, given the bureaucracy of the Russian regulatory approval system the actual deadline for revising the list of BATs for Russia should be 2-3 years.

5.5. Recommendations for specific instruments

Enterprise internal funds: tax incentives

In the case of enterprises´ internal funds, Russian legislation foresees a range of incentives that take the form of tax breaks, exemptions and others. The Russian Tax Code includes different tax benefits and that great importance is placed by federal legislation on accelerated depreciation of fixed and intangible assets. Regional and local taxes also include a range of tax exemptions (including lower profit tax, accelerated depreciations, more beneficial treatment of R&D costs, land tax exemptions or corporate property tax exemption), but limited to residents of innovation centres and special economic zones. The law 219-FZ foresees introduction of the accelerated amortization for the BAT equipment and possibility to deduct interest

payments from income tax for eligible equipment included in the list issue by the Government.

A detailed review of the tax programs in Russia was outside of the scope of this project. However, it is worth comparing the tax incentives envisioned in the Russia's legislation on the BAT transition mentioned earlier with different types of tax reliefs currently applied in EU countries offering tax credits and accelerated depreciation. Tax credits allow businesses to set a percentage of the investment cost associated with the qualifying equipment as a credit against taxes on business profits. Accelerated depreciation allows businesses to write-off the cost of depreciation of qualifying equipment more rapidly than standard equipment, thus effectively reducing the total cost of the equipment. Table 5.2 summarizes the tax relief (tax credits and accelerated depreciation) schemes implemented in the selected EU countries for energy and resource efficiency investments in industry and in Russia under the Law 219-FZ.

Table. 5.2: Summary of tax relief programs

	The Netherlands			United Kingdom	The Basque Country	Russia
Program	MIA	VAMIL	IEA	ECA	BCTL	Law 219-FZ
Description	Tax relief/ credit: 15%-36% of investment cost deductible against taxable profits	Accelerated depreciation: 75% write-off in first year	Tax relief/ credit: 45% of investment cost deductible against taxable profits	Accelerated depreciation: 100% write-off in first year	Tax relief/ credit: 30% of investment cost deductible against taxable profits	Accelerated depreciation for the BAT generally amounting to 60% write-off in year 1.

Tax credit programs to offset the costs of energy and resource efficiency investments are used in the Netherlands and the Basque Country in Spain, as discussed in Chapter 4. Accelerated depreciation is used in the Netherlands (combined with tax credits) and the UK. In the case of tax credit, the exact share of the investment that applies for the deduction varies between countries. The percentage of the purchase value that companies can write-off against their profit in the year of purchase also differs.

Experiences with these schemes show that tax credits and/or accelerated depreciation have potential to accelerate BAT adoption rates in a cost-effective manner and without posing a high administrative cost for the industry nor for the public sector. Russian accelerated depreciation rates for BAT equipment (around 60% in year 1) are in the middle of the range in the table (15% to 100%).

Analysed data in the Netherlands and the UK shows increasing rates of adoption of efficient technologies and investment amounts over the years. This is not the case for the Basque Country in Spain, where the amounts invested have been decreasing in the last year. According to the authorities this happened because companies were not aware of the scheme, but a clean technology list that is not regularly updated could have played a role. The increased amounts invested indicates that **businesses rely** on these schemes and that bureaucracy costs do not outweigh the benefits of the incentive (otherwise, entrepreneurs would not apply for the scheme).

Although figures on energy and carbon savings must be interpreted with care because part of the savings can be attributed other policies that coexist with tax reliefs and to free-riding as discussed in section 4, the data also indicates that the schemes are **cost-effective.** Preliminary calculations showed that the cost per kWh saved in the Netherlands and the UK was below the average national industry price of electricity. The cost per ton CO2 reduced in the Netherlands was estimated to be below the carbon price recommended by the High-Level Commission on Carbon Prices.

The data also shows that the **multiplier effect is quite high** and that the **administrative costs** (i.e. not including the budget) are **low** for regulators, ranging from 1.2% of total budget in the UK to 1.3% in the Netherlands.

It follows from the above that a well-designed accelerated depreciation and/or tax credit scheme (the scheme could also be a combination of both incentives as in the Netherlands) would have the potential to provide additional finance to fill the existing financial gap in Russia. To be cost-effective, such a scheme would need to include three essential elements: (i) a well-designed BAT list (see section 5.3 above); (ii) a simple and transparent procedure for claiming tax benefits/accelerated depreciation; (iii) an adequate level of tax incentives for different types of enterprises and types of spending.

A simple and transparent procedure for claiming tax benefits/accelerated depreciation

Apart from a clear and transparent BAT list, a simple and transparent procedure for claiming tax benefits/accelerated depreciation is also an important feature for the effectiveness of the incentive. This will reduce the administrative and reporting burden for the state and for the private sector in application of the tax incentives, which was one of the key barriers to the effectiveness and uptake of economic instruments to BAT in Russia identified by the experts.

In the MIA and VAMIL scheme, applications for claiming tax reliefs are straightforward (see below). A business that makes a capital investment in an equipment on the Environmental List must submit an online report on the investment to the Netherlands Enterprise Agency (RVO.NL) within three months of the date of the investment. RVO.nl **randomly** assesses whether the environmental investments reported meet the conditions and technical requirements of the scheme (this lowers the administrative burden and costs for the private sector). If a report falls outside the

sample, the tax reduction will be applied automatically. If it is included in the sample, a request for further information (the technique, the costs incurred the dates of the obligations) will be sent and checked within 6 months.

An adequate level of tax incentives for different types of enterprises and types of spending

While the current legislation provides for some tax incentives and accelerated depreciation, it would be useful to undertake an overall assessment of the potential/needs for tax incentives in Russia and eligibility of different types of enterprises and types of spending to address the financial needs analysis discussed earlier. The analysis of the relative advantage of taxes compared to other instruments is also recommended.

Conducting a survey to see how responsive enterprises would be to stronger incentives for the use of internal funds is recommended. This would help determine how businesses would react to tax exemptions, thus guiding the development of a potential accelerated depreciation and/or tax credit scheme.

Feedback received from experts at the workshop, as well as very scattered information readily available in the literature on the existing tax incentives suggest that there would be a great benefit in the Government providing a more streamlined information on what is currently available and to what types of enterprises, what investments and which sectors. For example, it might be useful to consider publishing a simplified 'Guide to tax incentives to support BAT transition' to strengthen capacity of both the civil servants administering the BAT programmes and of the private sector that are their targeted users.

Subsidies and loans from State funds

Subsidies in Russia can be granted at federal, regional and municipal level. They can come in the form of cash injections (or grants), investment in capital, credits from the budget, and state or municipal guarantees. The granting of a subsidy is usually preceded by the adoption of a relevant program for economic development or similar policy document.

Subsidies from the federal budget for environmental protection are provided to finance and co-finance capital expenditures of the constituent entities. However, the established procedure for subsidising environmental activities imposes restrictions on the possibility of obtaining state support in this area.

Federal Law envisions subsidies for the creation or modernisation of industrial infrastructure and production, including for the application of the BAT and lowering environmental impacts. These include subsidies to cover part of the interest payments on the loans to implement new investment projects in civic industries and subsidies to fund part of the R&D expenses.

These incentives go through the budgets at different levels and through the special state funds for industrial development. The state enterprise 'Fund for Industrial Development' aims at issuing special/discounted loans for the development of import-replacing and export-oriented industries and for transition to BATs. The Fund has seven financing programs: development projects, machine tool manufacturing, components, leasing projects, drug labelling, labour productivity, and industry digitalisation. The 'development projects' programme, that provides soft loans to the projects aiming at import substitution, export or production of competitive products with civil application, and the 'joint lending' programme, which lends to similar types of projects jointly from the federal and regional development funds, are particularly relevant for BAT.

The State Fund for Industrial Development offers loans of up to 5 years and interest rates in the range of 3-5% for development projects and equal to the existing market rate for leasing projects. Moreover, co-financing (i.e. % of the project budget that needs to be financed using own funds, funds of private investors and bank) required from the applicant is quite high: ≥ 50% of the project budget for development projects and ≥ 73% of the project budget for leasing projects. However, currently government supports the implementation of BAT through the industrial development fund only for a part of industries approved in accordance with the All-Russian Classification of Economic Activities, and most enterprises of the first category are not eligible to receive this state support (for example, energy supply is an industry non-funded by industrial development fund) (Kondratyeva, analytical note for the project).

To increase the potential for these types of instruments to support BAT transition in Russia it is also important to address the current barrier of the requirement of high co-financing (while in most cases a similar measure of economic incentives in the European Union does not imply co-financing at all). Furthermore, it is important to provide a clear, transparent and non-labour-intensive procedures for obtaining access to these economic incentives.

Discussions with industry representatives resulted in some further ideas on the instruments related to state funding to facilitate investment in BAT. One was financial guarantees from the state or international financial institutions on loans related to BAT, especially for the small and medium sized enterprises (SMEs). Such instruments are used elsewhere. For example, the International Finance Corporation (IFC), the World Bank´s private-sector lending arm, offers a range of partial guarantees for foreign investors covering exchange rate risk and sovereign risks. In addition to providing commercial financing for its own account, IFC uses a number of complementary tools to crowd in private sector financing that would otherwise not be available to projects with high development impact, especially to SMEs. One such approach is to blend concessional funds —typically from development partners— alongside IFC's own commercial funding. These helps raise funds from the private sector and extend the

period of loans[38]. Another example is GuarantCo, which is sponsored by the governments of the UK, Sweden, Switzerland and the Netherlands through the Private Infrastructure Development Group (PIDG) and the Dutch development bank FMO (GuarantCo, 2016). GuarantCo provides flexible guarantees over local currency loans to support projects and companies in raising debt financing in emerging markets. GuarantCo provides partial credit and partial risk guarantees, first loss guarantees, tenor extension or liquidity guarantees, thus loosening constraints in local currency debt finance to infrastructure projects (GuarantCo, 2016). These and other similar sources are worth investigating as sources of finance for SMEs.

Credit guarantees for SMEs from domestic financial institutions have also been used. In China the number of financial institutions offering such guarantees has grown rapidly over the last 25 years with outstanding guarantees in 2012 of around 1.4 trillion yuan (166€ billion) (Yvonne Zhang, 2013). The system has been criticized, however, for adverse selection of beneficiaries and problems of management. As Shim (2006) from the Bank of International Settlement notes, institutions offering such loans have also exhibited inadequate operating profits in recent years and there have been cases where the institutions have failed. These highlight the importance of sufficient capitalisation and prudent risk management, as well as the difficulty borrowers have in making a transition from credit guarantees. These experiences indicate that domestic financial institutions can make an important contribution to financing investments in SMEs through guarantees and the Russian Federation may wish to look at expanding such facilities, but there are significant risks and great care has to be taken in assessing borrower risks and avoiding problems of moral hazard and adverse selection.

A survey could be conducted to verify what changes in terms would increase the demand for investment to meet BAT requirements. In the meantime, experiences in other countries that proved cost-effective can give some guidance. Table 5.4 summarizes the subsidy or funding schemes implemented in Germany, Poland and Turkey, and compares them with details of loans implemented in Russia.

38 https://www.ifc.org/wps/wcm/connect/CORP_EXT_Content/IFC_External_Corporate_Site/Solutions/Products+and+Services/Blended-Finance

Table 5.4: BMWi-EE, KfW-EF, PolSEFF, TurSEFF and State Fund for Industrial Development terms of loan and lease

	Germany		Poland	Turkey	Russia (State Fund for Industrial Development)*	
Program	BMWi-EE (grants)	KfW-EP (loans)	PolSEFF (loans or lease)	TurSEFF (loans or lease)	Development projects (loans)	Leasing projects (lease)
Scope of application	Cross-cutting technologies	Environmental protection	Energy savings	Renewable Energy and Resource Efficiency	a) import substitution; b) BAT introduction; c) export	Technology upgrade or modernization of fixed production assets of Russian industrial companies.
Loan amount	10M€ (2012); 120 M€ (2017)	1.3 B€ (2009); 3.2 B€ (2011)	186 million € (2011 - 2014)	600 million € (2011 - 2016)	50 – 500 million RUB (i.e. ~0.7 – 7 million €)	50 – 500 million (i.e. ~ 0.7 – 7 million €)
Loan term	-	Up to 20 years, with up to 3 repayment-free	N.A.	Up to 5 years	Up to 5 years	Up to 5 years
Interest rate	-	From 1.03%	Market rate (1.5%)	1%	3% during the first 3 years with a bank guarantee, 5% with other security types; may be reduced by 2% p.a. if Russian made equipment is purchased for the value of ≥ 50 % of the loan amount	Fund: 1% p.a. Leasing company: market rate
Total allocated project budget	Single technology: 5,000 - 30,000 €	Usually up to 10 million € per project	Up to 250,000 € per project for simplified procedure; Up to 1 million € per project for	Up to 250,000 € per project for pre-approved	From 100 million (i.e. ~1.4 million €)	From 20 million (i.e. ~0.28 million €)

	Systemic approach: ≥ 30,000 €		standard procedure; 10-15% grant of eligible project costs	technologies; Up to 5 million € otherwise.		
Co-financing	Up 30% of net investment costs are covered by the grant for SMEs and up to 20% for bigger companies	Not needed. The Fund finances up to 100% of investment	Not needed. The Fund finances up to 100% of investment	Not needed. The Fund finances up to 100% of investment	≥ 50% of the project budget, including ≥ 15% of the loan amount from owner's funds/shareholders' equity	≥ 73% of the project budget. IDF finances from 10 to 90% of the down payment, without exceeding 27% of the total cost of equipment.

*Source: Industrial Development Fund (date unknown); Co-financing refers to the % of the project budget that needs to be financed using own funds, funds of private investors and bank

The schemes are cost-effective (see section 4). German BMWi-EE scheme shows a cost of 0.0379 €/kWh saved, which is below the average German industry price of electricity. The cost per ton CO2 saved is estimated at around € 15 in TurSEFF and at approximate € 30 per ton CO2 saved in PolSEFF. These figures are below the carbon prices recommended by the High-Level Commission on Carbon Prices.

An adequate level of incentive for different types of enterprises and types of spending

As noted in Chapter 3, Russian enterprises perceive the short length of credit and the high levels of market interest rates (at 11-15%) as specific barriers in relation to loans, and that they are possibly more sensitive to the length of the loan than to the rate of interest. The general terms of loan of the development project and the leasing project of the State Fund for Industrial Development, with quite short lending periods and high interest rates, has direct implications on the feasibility and speed of transition to the BAT in Russia. Lower interest rates, as it is the case with most programs analysed, and/or longer-term lending periods (the German KfW-EP loans scheme offers lending periods of up to 20 years) will be needed to speed up implementation timelines. With short loans, one would need to lower interest rates to achieve similar transition timelines. In the case of higher interest rates as in Russia one should consider longer lending periods to keep to similar implementation timelines (see section 2). Russia may need to undertake additional analysis on the terms of funding that would be required/attractive for the private sector.

The review has also identified the lack of internal funds/ collateral deposit as a barrier to get access to finance by many enterprises, especially smaller ones. Collateral requirements are also a problem in Turkey and Poland, where the type and amount of collateral needs to be arranged between the company applying for loan and the financial partner. In Poland, the Government launched in 2013 a program to offer security for loans drawn by micro, small and medium-size companies. In this way, business owners who do not have enough assets to offer as loan collateral have received access to financing (Bank Zachodni WBK, 2013).

The co-financing required from the applicant in the development project and the leasing project of the State Fund for Industrial Development is quite high, if compared with loans in Europe: ≥ 50% of the project budget for development projects and ≥ 73% of the project budget for leasing projects. This has direct implications on the feasibility and speed of transition to the BAT in Russia. A loan financing up to 100% of the cost of investment so that no co-financing would be required would help to address this barrier. All loans and subsidies programs analysed in this report but BMW finance up to 100% of the cost of investment.

A simple and transparent procedure

Lowering administrative burden and costs for the private sector is also needed, as one of the key barriers identified by the experts to the effectiveness and uptake of economic instruments to BAT in Russia is heavy bureaucratic and reporting burden. Experience in analysed EU countries show that, in most cases, schemes have both an advice and a financing component. The advice component provides grants to obtain advice and consulting services on energy and/or resource efficiency, lowering the management

costs for business. In Poland and Turkey, the advice component is financed by the European Commission. The financing component provides SMEs and/or enterprises of all sizes with grants, low interest loans or lease for investment.

Longer term lending periods, lower interest rates and/or lower co-financing requirements will need to be changed in order to speed implementation timelines. The size of the Fund will also have to be reviewed, as this is deemed as too limited for the scale of investment required for BATs.

A well-designed loan scheme would therefore have the potential to provide additional finance to fill the existing financial gap in Russia. As with the tax relief scheme, it is recommended *to consider a BAT list as part of the scheme* (see section 5.3 for details) in order to simplify and accelerate procedures for both business and program managers while keeping the system transparent, credible and robust, avoiding the technological lock-in, and balancing the interests of technology producers and polluting enterprises. Poland and Turkey use technology lists to determine eligibility for funding.

The participation of partner financial institutions responsible for providing the loans to SMEs is also recommended to ease the SME process in the way for financial support.

Feedback received from experts at the workshops, as well as very scattered information readily available in the literature on the existing loans suggest that there would be a great benefit in the Government providing a more streamlined information on what is currently available and to what types of enterprises, what investments and which sectors. For example, it might be useful to consider publishing a simplified 'Guide to loans to support BAT transition' to strengthen capacity of both the civil servants administering the BAT programmes and of the private sector that are their targeted users.

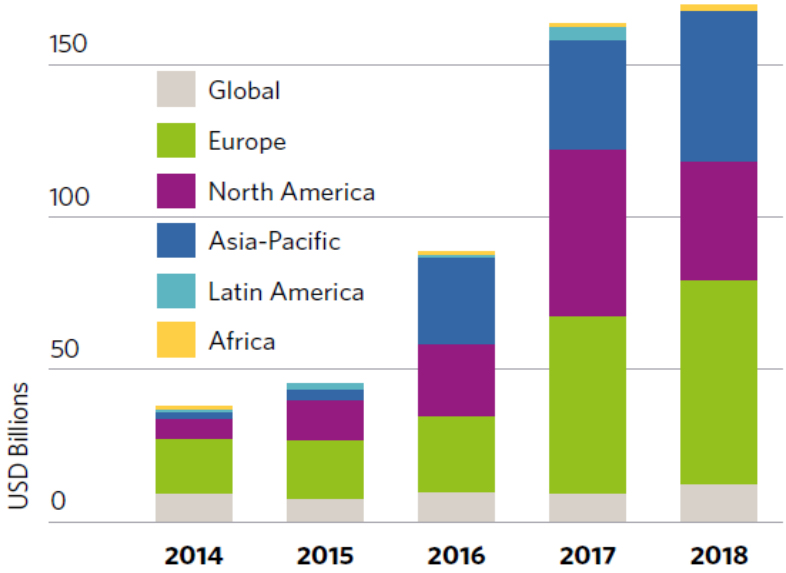
Subsidies for coupon payment on green bonds

Filling the financing gap will require complementary financing from public and private sectors. Russia's financial sector could finance large amounts of BAT investments if enabling public policies were to be put in place. To this respect, the Government has recently approved the rules for granting **subsidies to compensate companies for the coupon income on bonds** issued as part of investment projects to introduce the BATs at category 1 facilities. The idea behind this incentive is to take advantage of the green bonds market to facilitate BAT adoption.

Green bonds are any type of bond instrument where the proceeds will be exclusively applied to finance or re-finance, in part or in full, new and/or existing eligible green projects aim to address areas of environmental concern such as climate change, natural resources depletion, and ecosystems degradation. **The green bond market** has grown

very rapidly in the past decade (see Figure 5.1). Annual issuance has risen from 37$ billion in 2014 to over 167$billion in 2018, although in emerging markets the green bond era is just beginning (CBI, 2019). The market is now dominated by Europe, where France (14$ billion; 8% market share), Germany (7.6$ billion; 5% market share) and the Netherlands (7.4$ billion; 4% market share) are the main players, Asia-Pacific and the USA (34$ billion; 20% market share).

Figure 5.1: Green bond market development, 2014-2018



Source: Climate Bonds Initiative, 2019

All designated green projects should provide clear environmental benefits, which will be assessed and, where feasible, quantified by the issuer. The most common types of projects include renewable energy, energy and resource efficiency, clean transportation and green buildings. Therefore, green bonds are a good vehicle to finance the transition to low carbon economy. As BAT projects can be classified as green, **green bonds also stand as a key private sector solution helping finance investments in BATs**.

The participation of the **public sector** in the green bond market is increasing. Countries such as Belgium, France and Poland are issuing sovereign bonds to finance the transition to a low carbon economy. Local governments in France, Sweden and Spain are also issuing green bonds to finance environmentally friendly investments and help achieve their country's climate and energy goals. Box 5.1 includes the Polish sovereign bond.

Box 5.1: Poland

Main characteristics
Size: 750€ million (850$ million)

Date of issuance: December 2016

Tenor: 5 years

Proceeds: Mixed (33% energy, 33% energy efficiency, 33% sustainable land use)

Key benefits

Strategic: Investments deriving from Poland's green bond are to help achieve Poland's National Renewable Energy Action Plan, targeting 15% renewable energy consumption by 2020, and the creation of carbon sinks through its National Programme for the Augmentation of Forest Cover.

Investor demand: The team behind the issuance from the Ministry of Finance reported that one of the main benefits from the issuance was investor diversification. The transaction attracted many new investors with green mandates that had not previously bought a Polish sovereign bond.

A strong orderbook encouraged the Ministry of Finance to increase the transaction to EUR 750m from 500m.

Mobilising capital: The sovereign green bond includes expenditures such as subsidise which support further investment from the private sector

Steps to issuance

Preparation of relevant documentation, the independent verification and even changing the law to allow the 'earmarking' of funds to specific projects only took approximately one month – a short time for a debut issuance.

Engagement of government stakeholders: The green bond issuance was led by the Public Debt Department, with the collaboration of multiple departments in the Ministry of Finance, responsible for processing data from other Ministries and other Government Agencies.

Green Bond Framework:

- Six eligible sectors were identified: renewable energy, clean transportation, sustainable agriculture operations, afforestation, national parks, reclamation of heaps. The sectors are aligned with the broad categories included in the Green Bond Principles.
- Projects relating with the following sectors are excluded: fossil fuel for power generation and transportation, rail dedicated to transportation of fossil fuels, nuclear power generation, palm oil operations, production or provision of weapons/alcohol/gambling/adult entertainment, large scale hydro projects (>20MW), transmission systems where >25% of electricity transmitted is fossil-fuel generated, use of biomass in cogeneration coal plants.
- Eligible expenditures include budget allocations (including excise tax exemptions), subsidies and projects.
- The Polish Public Finance Act dated 27 August 2009 was amended to enable earmarking of funds to specific projects and proceeds to be credited to a separate 'Green Cash Account' and be disbursed to eligible projects over time.

- Unallocated proceeds will be held in accordance with the Treasury's normal liquidity management policy (cash, short term deposits, etc.).
- Payment of principal and interest are made from general funds, and are therefore not linked to the performance of the green projects.

Identification of eligible projects:

- Eligible expenditures will be approved by the State Treasury, represented by the Minister of Development and Finance and will depend on the alignment with eligible sectors, investment horizon, availability of information for reporting, other ESG/ external factors related to the agencies.
- Financing and re-financing of eligible projects is allowed.

Independent review:

- The State Treasury of Poland represented by the Minister of Development and Finance engaged an external reviewer to provide a second-party opinion on its Green Bond Framework.
- According to the external reviewer Poland's green bond framework is a step towards achieving its objective of transitioning to a low-emissions economy. The proceeds of the bond will have clear positive environmental impacts and the framework report to be robust, credible and transparent. The crediting of proceeds to a separate account allows for clear segregation and tracking of green bond proceeds.

Bond issuance: The bond was issued in December 2016. A EUR 500m issuance was targeted, and finally upsized to EUR750m.

Monitoring and reporting:

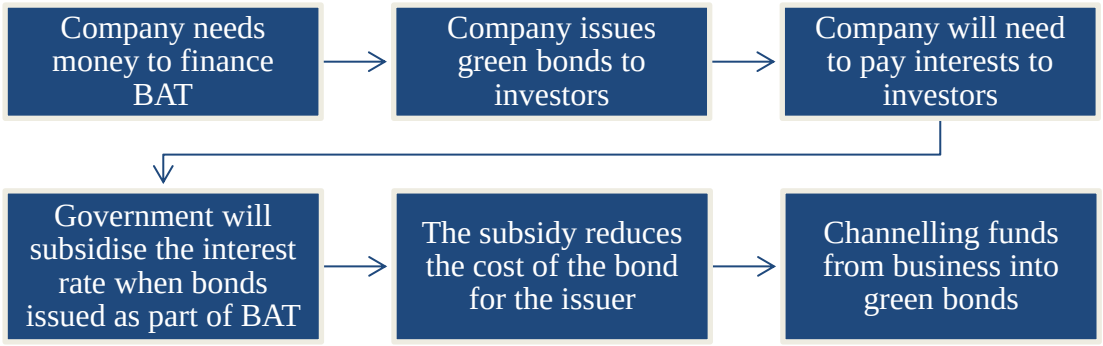
- Annual reporting is provided to investors until full allocation of the bond on the amount allocated to various sectors, unallocated funds and examples of projects from each sector.
- Where possible, reporting on environmental and social impacts will also be included.

Repeat: The Government has raised a second bond for 1€ bn, with a tenor of 8.5 years and a coupon 1.125.

Source: Climate Bonds Initiative, 2018

How do the subsidies for coupon payment on green bonds work? When companies need to raise money to finance new BAT projects, they may want to issue green bonds to investors. The company will issue a green bond that includes the terms of the loan, interest payments that will be made and the time at which the loaned funds (bond principal) must be paid back. The interest payment (the coupon) is part of the return that bondholders earn for loaning their funds to the issuer. The interest rate that determines the payment, i.e. the coupon rate, is the part that the government will subsidise when the bonds are issued as part of BAT investment projects. The subsidy will reduce the cost of the bond for the issuer, thus creating the conditions for

channelling funds from business into green bonds and creating the conditions for the development of a new green bonds market for financing BAT.



As eligible projects will be selected by an interdepartmental commission including representatives of the Ministry of Industry and Trade, the Ministry of Natural Resources and Environment, the Ministry of Energy, and the Ministry of Construction (TASS, 2019), this instrument will also play a role in the development of the green bonds market.

The idea behind this instrument is, therefore, that private sector players (commercial banks and industrial sector) and public authorities will work together to facilitate BAT adoption. The instrument could also help to develop the green bonds market in Russia.

To facilitate the process (i.e. reducing the costs for both the private sector and the regulator) and make it transparent for business, the Government should consider developing a robust classification system to establish clarity on what BATs are eligible for the green bond subsidy.

Introducing New Instruments

Instruments that are not currently in use in the RF (or are not the same) but for which we have experience can be summarized in the following table. It would be worth investigating further the potential to introduce these in the RF (or bring them back in as in the case of the soft loan program during the financial crises).

Table 5.5: Introducing new instruments

Instrument	Countries Where Used	Recommendations for BAT in RF
Soft loans/ refinancing instruments	Russia	During the last financial crisis, the Central Bank could lend money at half the market interest rate (i.e. 7-8% instead of 17.5%) for projects of special social importance. The impact of such loans could be significant in terms of taking up loans for BAT implementation, especially if the duration can be extended as well.

Loans for Environmental Protection	Germany	Long lending period (up to 20 years, with up to 3 repayment-free) and low interest rate (from 1.03%). Financing share of Fund up to 100% to avoid the need of co-financing
Grants for highly efficient cross sectoral technologies	Germany	Up 30% of net investment costs are covered by the grant for SMEs and up to 20% for bigger companies Cost-effective
Loans and lease for Energy Efficiency and or Resource Efficiency	Poland and Turkey	On-line List of Eligible Equipment Loan and lease possible Financial Partners Cost-effective
Tax Credits and Accelerated Depreciation	Netherlands	List of Clean Technologies Tax relief (15-36% of investment cost deductible from corporation taxes) and accelerated depreciation (75% write off in the first year of purchase). Can be combined for some technologies.
Tax Credits for Clean Technologies	Basque Country (Spain)	Clean Technology List Tax relief: 30% of investment cost deductible from corporation taxes
Accelerated Depreciation for Energy Efficiency	United Kingdom	Technology Product List Accelerated depreciation: 100 % write-off in the first year of purchase Cost-effective
Mutual Guarantee Societies	Nearly all EU MS	Facilitate access to credit for SMEs. Support SMEs financial position against credit institutions, suppliers, customers and government.

Mutual Guarantee Societies

SMEs and the self-employed very often have difficulties accessing to finance because they do not have the required collateral. Mutual Guarantee Societies (MGS) contribute to overcoming this barrier: **a guarantee provided by a guarantee society on behalf of the SME to the bank replaces this missing collateral and enables the bank to grant the loan**. The guarantee is a financial commitment by the guarantee society to repay up to a certain percentage of the loan to the financial institution in case the SME is not able to pay. The guarantee usually covers up to 80% of the bank loan, leaving 20% of the risk with the lender. The SME remains liable for the loan.

Mutual Guarantee Societies are private guarantee institutions **created by beneficiary SMEs**. They typically have a cooperative or mutual statute. This means that the MGS' capital is provided directly by the SMEs that apply for a loan guarantee in form of cooperative or mutual shares. The Mutual Guarantee Societies are usually **private** and run by entrepreneurs, although **Public** Guarantee Institutions funded and run by public shareholders have been set up in a few countries. In some cases, Guarantee societies have chosen a **public-private** partnership model, where the public shareholder usually holds a minority stake.

Guarantee schemes provide benefits to beneficiary SMEs, their banks and public authorities:

- For SMEs, they provide access to finance and additional support when needed. Using data from guarantee banks and own surveys to enterprises and banks for Germany, Schmidt and Elkan (2006) found that 60% of the supported enterprises indicated that without the loan guarantee they would not have obtained a loan. 40% of banks indicated that SMEs would have obtained a loan at significantly higher interest rates.
- For banks, they reduce risk exposure and increase the lending activity. Schmidt and Elkan (2006) also found that 82% of the loans to established enterprises and 95% of the loans to start-ups would not have been granted by banks without the guarantee. For the majority (90%) of the enterprises, the guarantee affected the volume or time of investment.
- The economic and fiscal net benefits of guarantee banks have been analysed for Germany over the period 1991-2015. Results in P. Henneckea, et al. (2017) show that the economic benefits of the guarantee banks are considerable in terms of increased production and employment, while the economic costs are negligible. The real GDP increases by about 1.2 euro per euro guarantee each year. In the years 2008 to 2014, there were net fiscal gains of several hundred million euros.

The overall positive benefits from an economic and social development policy perspective have led nearly all EU Member States in Europe as well as Turkey to set up Guarantee organisations. In Spain, for example, the Guarantee System was regulated in the late 1970s (Government of Spain, 2017).

Other instruments

Some other instruments worth investigating include:

- Voluntary agreements encourage resource efficiency in groups of businesses by creating shared goals. The Intergovernmental Panel on Climate Change (IPCC) refers to voluntary action as “actions taken by firms, NGOs, and other actors that go beyond regulatory requirements” and states that “Voluntary agreements represent an evolution from traditional mandatory approaches based on conventional or economic regulations and intend to provide further flexibility to polluters. They are based on the idea that, under certain conditions, polluters can decide collectively to commit themselves to abatement instead of, or beyond the requirements of regulation” (IPCC, 2014). Voluntary agreements are widely used in Finland, Germany, Greece, Italy, Luxembourg, Spain, The Netherlands, and the UK (European Commission, 2015). Some voluntary agreements are closer to self-commitments of industry, while others demand intense negotiations with public authorities. In Spain, voluntary agreements are used to go beyond legal commitments to implement circular economy principles, promote business competitiveness and encourage resource efficiency. One example is the voluntary

agreement between the Spanish Association of Pulp, Paper and Cardboard Manufacturers (ASPAPEL) and the Ministry of Environment, which is considered by industry as a key policy to incentivise the adoption of the best available technologies. The Dutch government supports voluntary agreements through the Green Deals policy. Green Deals are agreements between the Dutch government and other parties (companies, civil society organisations and other public authorities) aimed at removing non-financial barriers to enable energy, but also cover themes such as climate, water, raw materials, biodiversity, mobility, biobased economy, construction and food.

- BAT implementation awards to adopting industry in order to build reputation. The award recognises and rewards those companies whose actions have had a positive environmental impact through BAT adoption. The Award enables businesses to inspire each other and share examples of good practices. In Europe, the European Business Awards for the Environment (EBAE) is presented every two years. To be eligible for consideration, companies must have first succeeded in their national award schemes and be nominated by their respective countries. The 2016-17 competition saw 148 entries from 21 EU Member States and candidate countries.
- Research and development budget for Universities and Tech Centres aligned with BAT priorities.
- BAT training and capacity building schemes for technology suppliers, financial institutions and industry.
- Showcase existing measures and mechanisms and document and widely present success stories to build confidence and acceptability

Linking support for BAT transition and strategic development priorities and programmes

The discussions with the expert community in Russia in the course of the project show that there is a strong need to improve an understanding among the government, expert and business communities of the overarching objectives for the transition to BAT in the Russia. These objectives go beyond achieving short-term reduction in environmental impact to long-term industrial modernisation and revamp of industrial production, including, according to the Federal Project “Implementing the Best Available Technologies”, the following:

- increasing the competitiveness of the domestic industry internationally;
- maximum localization of the production of equipment necessary to stimulate the implementation of the BAT in Russia;

- strengthening interaction between business, scientific and financial institutions;
- reducing the energy intensity of GDP by stimulating BAT in the area of energy efficiency;
- improvement of the environmental situation in the country by improving the efficiency of environmental regulation;
- increasing the level of innovation activity.

In this context, 13 national projects that have been identified by the Government of Russia as the strategic priority areas with total financing of 25 trillion roubles by 2024 offer an important opportunity for linking complementary priorities[39]. It would be useful to consider synergies between the objectives and implementation mechanisms of the BAT transition and the national projects in the areas Ecology, Complex plan of modernisation and expansion of backbone infrastructure, Habitat and Urban Environment, SME support and potentially others. Financing earmarked for the implementation of the national projects could be targeted to achieve both BAT and other priority objectives. For example, the SME national project envisions 450 billion roubles support primarily through subsidies to the interest on loan, so that the final interest rate does not exceed 8.5 percent. There is a clear scope for potential alignment with the BAT objectives.

To enable this understanding of the synergies and the alignment between the strategic development priorities and BAT it is important to increase awareness on the goals and objectives for the implementation of BAT in Russia among the scientific, business and government experts.

It is also important to undertake targeted capacity building of stakeholders directly involved in the implementation of BAT at different levels:

- federal and regional officials forming the socio-economic policy and the relevant programs for their implementation, in particular, programs for attracting investments;
- heads of companies and enterprises developing programs for the revamp and technical re-equipment of production and plans for their financing;
- scientific and technical managers and employees determining the real choice of BAT for their industries taking into account the specific technical and economic conditions.

[39] https://drive.google.com/file/d/14xRtDdmFGjH6bHncGKojnxAmQudG2rB7/view

6. Conclusions and Recommendations

An evaluation of the effectiveness of the economic instruments used to accelerate BAT adoption or achievement of similar policy goals (e.g. energy efficiency and resource efficiency) in Germany, the Netherlands, the Basque Country in Spain, Poland, Turkey and the UK demonstrates that such policies are quite cost-effective. Lessons learnt from the experiences in these countries inform recommendations for future decisions on the design and application of similar instruments in Russia taking into account the criteria for selecting the instruments to promote BAT and local regulatory, financial, technological and socio-economic context.

Criteria for selecting the instruments to promote BAT

The main objective and key criteria for selecting the instruments to promote BAT is to achieve compliance as quickly as possible and at the least cost to the government and to the enterprises.

In the case of the stick, the government may consider raising the level of emission charges. However, these may need to be raised very high to provide enough incentive to speed up the implementation of BAT by even 1-2 years. To avoid potential impacts on the firm's competitiveness it is suggested that the cost of environmental regulation is not much higher than one percent of the value of manufacturing value added.

In the case of the carrot, the government should consider wider application and further development of economic instruments that lower the cost of advanced implementation enough so that the enterprise finds it profitable to go for that option. At the same time instruments that achieve this objective at a minimum cost to the government can be prioritised. The instruments should aim to lower the costs just enough to make the early implementation the option of choice. The key parameters that should determine the optimal level of subsidies are the market rate of interest that enterprises face and the payback period (or duration of loan) that is available to them.

Challenges for the economic instruments to support BAT transition in Russia

In designing and implementing the existing and potential new instruments to support BAT in Russia, several barriers should be addressed that could jeopardize their effectiveness. While instruments like charges and fines have historically worked well in Russia, there is a strong perception among the experts and businesses of the lack of fairness in the principles on which the system of charges is built being mainly the means for filling the budget rather than supporting achievement of environmental outcomes. Bottlenecks include considerations around the levels of the fines being too low to stimulate investment, low capacity of the regulator to enforce the standards and collect the fines.

Instruments of direct support to BAT in the form of soft loans, subsidies and tax incentives would have potential to provide access to finance for funding industrial transitions. However, concerns about high bureaucracy and heavy reporting burden

and litigation risks exist. Moreover, the interest rates of loans are considered too high and the lending periods too short. Enterprises very often have difficulties accessing finance because they do not have the required collateral.

There are also challenges around additional expertise required for administration of financial incentives both in the public sector at the control and monitoring agencies, at the investing companies and at the financial institutions participating in the incentive schemes.

While there is no agreement on the expected cost of BAT adoption in Russia among the expert community, evidence and expert opinion suggest that own resources in industry are limited, and that a financing gap exists.

Opportunities and recommendations

Strengthen the analytical basis around the cost of transition

There is a strong need to better understand the cost of BAT implementation in Russia. Accurate and reliable estimates of the costs and financial needs across sectors are important in order to design an effective financing support program. The following actions are recommended in this context:

1. to carry out an in-depth analysis of the costs of implementing BAT across sectors up to 5 years. A survey in a representative number of companies focusing on how much each enterprise plans to invest in BATs and how much of these resources need to be borrowed from the financial system could be undertaken;
2. to estimate the required investments for the next 6-10 years based on indicative policies.
3. To evaluate the financial gap (i.e. the difference between companies' own resources currently available for financing BAT adoption and their financial needs).
4. To address this financing gap, it will be necessary to (a) identify additional sources of finance and/or (b) to assess the terms on which the existing enterprises could consider increasing their level of investment, as the current terms of loans make it difficult to access external funds from either public or financial institutions.

Additional sources of finance

Russian legislation stipulates the provision of state support for business to protect the environment and introduces specific economic instruments to support the enterprises in adopting BATs. However, there is little information on the effectiveness of the current economic instruments in place (e.g. environmental charges, tax credits, accelerated depreciation and other instruments).

5. To improve effectiveness of the current instruments through fine-tuning and to draw lessons for the design of new instruments, it is recommended to conduct a study on the effectiveness of these instruments and analyse if some of the

instruments can potentially be adapted to be used as cost-effective sources of additional finance for the BAT.

The Government has recently approved the rules for granting subsidies to compensate companies for the coupon income on bonds issued as part of investment projects to introduce the BATs at category 1 facilities. The idea behind this incentive is to take advantage of the green bonds market to facilitate BAT adoption.

6. To facilitate the application of the subsidies for coupon income and make the process more transparent for business, it is recommended that the Government develops a robust classification system to establish clarity on what BATs are eligible for the green bond subsidy.

Terms on which the existing enterprises could consider increasing their level of investment

Experiences with tax relief schemes in European countries show that tax credits and/or accelerated depreciation have potential to accelerate BAT adoption rates in a cost-effective manner and without posing a high administrative cost for the industry nor for the public sector. Russian accelerated depreciation rates for BAT equipment (around 60% in year 1) are in the middle of the range schemes analysed (15% to 100%).

7. It would be useful to undertake an overall assessment of the potential/needs for tax incentives in Russia and eligibility of different types of enterprises and types of spending to address the financial needs analysis discussed earlier. The analysis of the relative advantage of taxes compared to other instruments is also recommended.

8. It is also important to conduct a survey to see how responsive enterprises would be to stronger economic incentives. This would help determine how businesses would react to tax exemptions, thus guiding the development of a potential accelerated depreciation and/or tax credit scheme.

Russian enterprises perceive the short length of credit and the high levels of market interest rates as specific barriers in relation to loans. The quite short lending periods and high interest rates of loans provided by the State Fund for Industrial Development, have direct implications on the feasibility and speed of transition to the BAT in Russia.

9. Longer term lending periods, lower interest rates and/or lower co-financing requirements need to be addressed in order to speed up the implementation timelines. This could be achieved through the creation of further specialized credit lines or soft loans programmes, specialized guarantee vehicles and targeted financing programmes.

10. Conducting a survey to verify what changes in terms of loans (i.e. interest rate, lending period and co-financing required from the loan applicant) would increase the demand for investment to meet BAT requirements is recommended.

11. Very often, the lack of collateral is also a barrier to get access to finance. Mutual Guarantee Societies (MGS) provide a guarantee on behalf of the SME to the bank, replacing this missing collateral and enabling the bank to grant the loan. Exploring a Guarantee System in Russia is recommended.

12. In designing and implementing the economic support instruments for the BAT it is important to draw on the previous experience with similar instruments, for example to support energy efficiency or pollution reduction, in Russia.

A simple and transparent procedure

A simple and transparent procedure to apply for loan or for claiming tax benefits/accelerated depreciation is an important feature, as it will reduce the administrative and reporting burden for the state and for the private sector. This was identified as one of the key barriers to the effectiveness and uptake of economic instruments to BAT in Russia.

13. It is recommended to create a Technology List, as it will simplify and accelerate procedures for both business and program managers while keeping the system transparent, credible and robust. The technology list will also play a very important role in avoiding the technological lock-in and will enable to balance the interests of technology producers and polluting enterprises.

14. The List could be based on the existing technology list based on the lists of BATs given in the industry information and technical reference books on BAT (BAT ITS). It will need to include clear and relatively regular timeframe for updates (given the bureaucracy of the Russian regulatory approval system, a 2-3 years update period is recommended), transparent procedure on how and by whom new technologies can be proposed for the list and be accessible to all interested parties through a usable website.

Capacity building

There is also a need to strengthen capacity of the key actors and to address the lack of successful experience at scale in Russia with economic instruments of stimulating investment.

15. There would be a great benefit in the Government providing streamlined information on what support is currently available and to what types of enterprises, what investments and which sectors. For example, it might be useful to consider publishing a simplified ‘Guide to tax incentives to support BAT transition’ to strengthen capacity of both the civil servants administering the BAT programmes and of the private sector that are their targeted users.

16. Raising awareness and showcasing positive experiences with application of economic support instruments would increase stakeholder confidence and potential uptake of the instruments. Similarly, engagement with and capacity

building of the key players in the financial system to support the BAT transition is crucial for scaling up finance.

17. Training and development of education system on environmental, technical, legal and financial aspects of BAT implementation for the experts participating in the BAT processes in Russia and public awareness building would be important going forward. Development of 'manuals' with algorithms for actions and short examples, as well having simple navigators on various forms of support for BAT and express trainings (business games) on the development of applications for support would help limit administrative burden.

Other initiatives

18. Other instruments worth investigating include voluntary agreements to encourage resource efficiency in groups of businesses by creating shared goals, BAT implementation awards to adopting industry in order to build reputation, and research and development budget for Universities and Tech Centres aligned with BAT priorities.

There is also a strong need to improve an understanding among the government, expert and business communities of the overarching objectives for the transition to BAT in Russia that go beyond achieving short-term reduction in environmental impact to long-term industrial modernisation and revamp of industrial production.

19. Linking support for BAT transition and strategic development priorities and programmes offers an opportunity to raise support for the BAT transition at scale. This should include consideration of the potential of linking some of the 13 national projects (e.g. in the areas Ecology, Complex plan of modernisation and expansion of backbone infrastructure, Habitat and Urban Environment, SME support and potentially others) and the objectives of the BAT transition so that a share of the 25 trillion roubles dedicated to those strategic priority areas up to 2024 can be used to promote BAT adoption.

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Annex I: Comparing Costs and Benefits of Subsidized Loans for BAT

The capital cost for the investment required to meet BAT is C_0 and the market rate of interest to the enterprise is r_0.

The enterprise can delay making the investment for T years without penalty. In that case the present value cost to the enterprise of undertaking the investment T years from now is

$$\frac{C_0}{(1+r_0)^T} \qquad (1)$$

The government can offer a loan payable in equal instalments over N years at a rate of r_1, less than r_0. The repayments for the loan taken out now will be R_1 per year where

$$R_1 = C_0\left[\frac{(1-\delta_1)}{(1-\delta_1^N)}\right]; \delta_1 = \frac{1}{(1+r_1)} \qquad (2)$$

The true cost of the loan repayment scheme, however, depends on the market rate of interest r_0. This cost is written as C_1 where:

$$C_1 = R_1\left[\frac{(1-\delta_0^N)}{(1-\delta_0)}\right]; \delta_0 = \frac{1}{(1+r_0)} \qquad (3)$$

Substituting for R_1 from (2) into (3) gives:

$$C_1 = C_0\left[\frac{(1-\delta_1)}{(1-\delta_1^N)}\right]\left[\frac{(1-\delta_0^N)}{(1-\delta_0)}\right] \qquad (4)$$

For the enterprise to prefer the loan now rather than delaying the investment by T years the following inequality must hold:

$$\frac{C_0}{(1+r_0)^T} > C_0\left[\frac{(1-\delta_1)}{(1-\delta_1^N)}\right]\left[\frac{(1-\delta_0^N)}{(1-\delta_0)}\right] \qquad (5)$$

The critical minimum subsidized rate and loan period (r_{1*} and N_* respectively) are given the values that solve the equation:

$$\delta^T = \left[\frac{(1-\delta_{1*})}{(1-\delta_{1*}^{N*})}\right]\left[\frac{(1-\delta_0^{N*})}{(1-\delta_0)}\right] \qquad (6)$$

Equation (6), which is independent of C_0, has been solved for different values of market rate of interest to the enterprise is r_0 and delay period T.